WORKERS IN NATURE'S WORKSHOP

Wm. J. Claxton

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Workers in Nature's Workshop

THE NIGHT WATCHMAN AND THE POACHER

(Barn Owl and Stoat)

Fr.

Workers in Nature's Workshop

BY

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"ROUND THE YEAR WITH NATURE" "METHODICAL NATURE STUDY

"LESSONS FROM NATURE'S WORKSHOP" ETC.

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Preface

THIS little book is written as a companion volume to "Lessons from Nature's Workshop." Possibly many of my young readers, together with their teachers and parents, have not looked upon Nature Study from the point of view taken throughout these chapters, and it is therefore hoped that their interest and sympathy with the lower orders of animate life will be enhanced.

Many trades which we mortals follow have their counterparts in the functions of the higher animals, insects, and plants, but, whereas it takes us years of toil and infinite perseverance to learn even one trade thoroughly, our lowly workers seem to be fully equipped with the necessary knowledge when they are born into the world.

Part of the interest in the book will probably lie in the children seeing if they can

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'place' the animals, birds, and plants under the different 'trades' before they read the chapters. Should the book be used as a class-reader, it is hoped that each lesson may form the basis of a little chat between teacher and pupils on the subject under discussion. Lack of space forbids a more complete list of representatives of the various workers, but in many cases the children will be able to supplement the list. For this reason I have, as far as possible, selected animals and plants with which my young readers are quite familiar.

W. J. C.

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Workers in Nature's Workshop

CHAPTER I

THE ADVERTISERS

HAVE any of my young readers who live in large towns stood in front of a hoarding and looked at the huge posters displayed upon it? Some of the pictures are quite works of art. Hundreds of pounds have probably been paid to produce these pictures in such a way that they will attract the notice of the passers-by, and call attention to the articles which they advertise. You are quite familiar with several of the most famous posters, and perhaps in the winter-time you have played that indoor game in which you look at the picture and then supply the advertiser's words below.

This is said to be the 'age of advertisement.' People in business who have things

to sell must call attention to their goods. Sometimes large firms spend thousands and thousands of pounds in a year on advertising alone. In one or two of the chief daily newspapers the charge to the advertiser is three or four hundred pounds for the use of the front page for one day only. Many firms advertise their wares by giving away free samples of them. Sandwich-men walk up and down the busy streets displaying attractive posters on their boards. Wherever we go, in bus, tram, or train, we shall see advertisements of some kind or other.

Now why has your attention been called to the methods employed by the human advertiser? Simply to show you that they have their counterpart in the plant world. Many plants are capital advertisers.

"But what have they to advertise?" you ask. "Surely they do not wish to attract man's notice, for, if so, he will probably pluck them, or fleck off their heads with his walking-stick."

No; if plants could speak they would probably tell us that this is the last thing they would wish to do. Their one great aim is to attract the bees and other flying insects, so that some of their pollen may be

carried from flower to flower and they may be fertilized. They seem to say, as they spread themselves out in the sunshine: "Here we are, all very fine and large. Hurry up and get our pollen. Push your trunks into our rich stores of nectar: plenty of food and a great reward await you."

If you were asked, "Which is the most important part of the flowering plant?" you would probably reply: "Why, the brightly-hued petals." This would be wrong, though. By far the most important parts of the flower are what are known as the organs of reproduction. These comprise the pistil, stamens, stigmas, and anthers, or dust-boxes. The latter contain the pollen, and the reason many flowers are provided by nature with their bright colours and sweet perfume is that they must attract certain insects, so that the pollen from the dust-boxes is transferred to the sticky stigmas of another flower of the same species. We call this 'cross-fertilization,' and the gardener will tell you that in most cases flowers which are cross-fertilized produce better seeds than those which are self-pollinated.

Of course you understand what is meant

by the fertilization of a seed. Lying down at the base of the pistil is the young, immature seed. Perhaps there are scores of other little green seeds with it, all of which are packed closely together in the seed-box. Standing high up in the centre of the flower is the long style, which is a kind of stalk, and on the top of the style there are one or more stigmas, or, as boys sometimes call them, 'sticky-tips.' Around the style there are, as a rule, several long threads—the stamens—and on the top of these threads there are the dust-boxes. When the dust-boxes become ripe and are ready to release their pollen, some of this probably reaches the 'sticky-tip' as it is moved either by the wind or by an insect, such as the bee, pushing past it as it bustles about inside the flower. In time these tiny pollen-grains send out very fine tubes, which penetrate the long style and grow downwards. Soon the tubes reach the little green seeds, and a great change takes place. Should the seeds, or, as we should call them, *ovules*, be ready to be fertilized, the tubes entwine themselves around them, and in due course they grow until they become ripe, and are ready for dispersal, when they will have the power

to reproduce other plants of the same species. This is a very general description of the fertilization of a flower. Do not think that every flower has all these parts. Some possess a pistil, but no stamens; others have stamens, but no pistil. These are known as *imperfect flowers*.

Now in many cases the pollen is carried from the stamens of one flower to the pistil of another of the same kind by the wind. A good example of this may be seen in the catkins of the hazel, or 'lambs'-tails,' as they are commonly called. The long male catkins sway about in the breeze, and some of the pollen is blown on to the tiny red female flowers found at the ends of the hazel twigs. Of course much of the pollen is wasted, but there is an abundance of it, and some of it is almost sure to find its mark. On the other hand, there are many flowers which are so formed that it is nearly impossible for the wind to carry their pollen away, and it is in such cases as these that insects are of the greatest service as pollen-bearers.

Let us now watch a bee paying a visit to a sweet-pea flower. You know that the blossom consists of four parts: (1) a large standard, (2) and (3) two wing-petals, (4) a

keel. Within these petals there are the stamens and pistil, and all the four parts are generally locked together so that the stamens and pistil are hidden. Along comes the bee, attracted by the bright hues of the blossom, and it probably clings firmly to the boat-shaped keel with its forelegs. Step by step it pushes its way into the flower, and the pollen is shaken from the stamens all over the insect's body. As the bee penetrates farther into the flower it brushes by the sticky stigma, and a little of the pollen on the under-side of its body adheres to the 'sticky tip.' Probably some of this pollen had been brought from another pea-blossom near by; if so, the flower will be cross-fertilized. But, as a general rule, the pea is self-fertilized, because the pollen is imprisoned so closely in the locked petals.

There is one very remarkable thing about insect fertilization. If you watch the bee for some time you will see that it enters blossoms only of the same kind of flower at one visit. Thus, suppose the bee visited a garden containing foxgloves, asters, marigolds, sweet-peas and other flowers, all growing together. If the insect first selects a pea-blossom, it will invariably keep to the pea-blossoms until it returns home. It does not, as a rule,

dodge about from one flower to another of a different species.

Now that we have seen the great need of insect-fertilization of flowers, let us see how the flowers advertise themselves so that the insects are attracted.

There are three principal methods of advertisement. These are: (1) by the brightly-coloured petals; (2) stores of honey; (3) sweet perfume. Suppose we take the wild rose as an example. Here the petals are as widely extended as it is possible to have them, and they are of a pinkish-white hue, which can be seen at a great distance. The large cup-shaped blossoms, spreading themselves out on the top of the hedge, are sure to attract the passing insects.

You know, too, that many flower-buds open in the spring-time before the leaves unfold. The cherry and pear-trees are covered with blossom before the leaves appear, and thousands of insects visit them which otherwise would pass by if the thick foliage covered the blossom.

Other flowers, like the tall pink foxglove, display their blossoms in the most alluring way. When growing wild they are generally found on a hedgerow bank, and the dark

foliage of the bushes contrasts with their brighter colour, so that they are seen for a great distance. As the flowers, mounted on their tall, thin stems, face the open meadow, they seem to say to the gaudy old bumble-bees: "Here we are. We have turned our tubes down so that you can easily crawl up inside us. Come and gather our rich stores of nectar."

Do not imagine that all flowers offer advertisements to the bees. Certain flowers, such as the monkshood and foxglove, are specially adapted for bees to visit them, but others require moths, butterflies, and even beetles. The primrose advertises for moths. As the evening primrose opens in the twilight of a summer evening the hovering moths easily see it standing up against its dark background, and they soon thrust their long trunks into its tube-shaped corolla.

Probably the honeysuckle attracts moths more by its powerful perfume than by anything else, especially as the scent is much stronger in the evening than by day. It has been proved by experiment that certain night-flying insects, such as the moths, can discern the scent of the honeysuckle for a considerable distance.

The Advertisers

Have you ever noticed the faint lines on the lower and largest petal of a violet? These are known as 'path-finders,' or 'honey-guides,' and along these the insects travel to the rich stores of nectar within. Still another form of advertisement, is it not?

The beautiful white water-lilies, lying on the surface of the water, are a great attraction to the water-beetles, and these active creatures quickly climb over the large petals into the widely opened cups in search of their food, rubbing against the stamens and 'sticky-tips' as they feed.

There are, too, certain flowers, such as the daisy, chamomile, and cornflower, which have very fine outer florets as advertisements, so that insects may be tempted to visit the smaller and insignificant florets within. In many cases the outer flowers are imperfect, and their chief function is to make the whole flower attractive, in order that the perfect seed-bearing flowers in the centre, which are not nearly as showy, may have their pollen distributed by the aid of insects.

CHAPTER II

THE TOURISTS

MANY of my young readers may number themselves among the large army of tourists. Nowadays there are tourists of all kinds. Many people undertake cycling tours, and those who keep a motor-car have quite probably toured all over the country. In whatever part of these islands we may be during the holiday season, we can see tourists of one sort or another.

During the last few years there has been an enormous increase in the number of tourists who go abroad. Thousands and thousands of British people spend two or three weeks in France, Belgium, and the Rhine Valley every year. The railway and steamship companies are able to issue very cheap tourist tickets, and some of the chief tourist agencies provide guides who conduct the travellers through the various countries. It is quite a common occurrence to meet

people who have been to Paris, Ostend, Berlin, the beautiful valleys of the Rhine and Rhône, the Swiss Alps, or the charming Norwegian fjords. During the year in which this book was written a large party of London school children was taken for a short holiday on the Continent, and, to judge by the photographs of the happy youngsters which appeared in many of the illustrated papers, they enjoyed the trip immensely.

How nice it would be if we could leave the dull and dreary skies of an English November behind us, and spend the gloomy winter by the sheltered shores of the Mediterranean Sea, or under the clear skies of distant Egypt! Happy, happy, little birds who can quit this country when you like! Your coming brings gladness to the woods long silent, and your going saddens northern lands clothed in their autumn dress.

> "*Once in each revolving year,*
> *Gentle bird! we find thee here;*
> *When nature wears her summer vest*
> *Thou com'st to weave thy simple nest;*
> *But, when the chilling winter lowers,*
> *Again thou seek'st the genial bowers*
> *Of Memphis, or the shores of Nile.*"

Many of our little feathered friends are capital tourists. Towards the end of

summer, when the days rapidly shorten and the air becomes chill, vast numbers of swallows, martins, swifts, and other migrants may be seen gathering together in preparation for their long flight. Telegraph-wires and other suitable supports are covered with them for two or three days. At length they suddenly disappear. One afternoon hundreds of chattering swallows may have been seen on the wires; the next morning all have departed. Towards evening they have taken a bee-line to the coast, to cross the sea by night.

There are several reasons why birds migrate. One of the chief seems to be that their natural food-supply in the countries where they spend the summer would become very short in the winter. Many of the migrants live on insects, seeds, and fruits, such as hedgerow berries. When the ground is frost-bound, and covered with snow, this food is very hard to obtain, and were the migrants to stay in England countless numbers of them would perish. Another reason is that the birds require a suitable climate in which to bring up their young. Of course you know that migratory birds build nests and lay eggs in the countries

to which they go as well as in this country.

Strange to say, many people, when speaking of birds of passage, think only of the migrants which visit us in early summer and depart in autumn. I should think it is highly probable that there are as many incomers as out-goers. As soon as the cuckoos, swallows, swifts, nightingales, redstarts, wrynecks, and many other bird families take their departure at various times during September, October, and November, there begin to stream over the North Sea vast numbers of redwings, fieldfares, bramblings, snow-buntings, woodcocks, snipe, etc., which quite fill their places. Some of these little tourists come from a great distance. The pretty little snow-bunting, which may be found in winter in great flocks on the Norfolk Broads, is one of the farthest travellers, for during the English summer it makes its home in wild and dreary Siberia. Should you see a little brambling hopping about on the branches of a beech-tree, you wonder how it can cross such a wide stretch of sea as that between Northern Norway and our eastern coasts. It looks so weak—you might easily mistake it for a chaffinch—that

it seems impossible that such a delicate bird should be able to stand a flight of hundreds of miles.

Many experiments have been performed for the purpose of finding out how far our feathered tourists fly. For many years it was thought that the storks inhabiting the Netherlands and Germany never migrated beyond the northern shores of Africa. This was, however, proved to be quite wrong. A Prussian ornithological society captured four storks, and marked them by placing very light bands around their legs, on which were impressed certain signs. The storks were then liberated, and in due course migrated. Two of these storks were ultimately captured, not in Northern Africa, *but in the Transvaal*, as it was then called. These birds had therefore flown about 5500 miles. Those of you who have visited Holland in the late summer may have seen many hundreds of these ungainly-looking birds assembling in the meadows just before taking their long flight. Some of the flocks contain no less than 5000 birds, and, when on the wing, at a short distance away they look like hundreds of aeroplanes flying closely together.

The Tourists

The times of arrival and departure of our winged tourists depend almost entirely on the weather, and not on the calendar. Should we be favoured with a very warm September and October many birds, such as the cuckoo, swallow, swift, nightingale, etc., prolong their stay, but, if a dull, chilly August is followed by a cold September, their departure is hastened by a month or more. Their stay seems to depend far more on the state of the weather than on the food-supply, for when the large swallow family leaves us, insect food is generally more abundant and more easily obtained than at any other time. For long periods, year by year, naturalists all over the country have compiled lists recording the dates when they first saw or heard a swallow, cuckoo, or nightingale, and as a result of their observations we can generally expect the following 'tourists' about the times mentioned:—

Last week in March or first week in April: Wryneck (cuckoo's mate), ring ouzel, spotted crake, sand martin, chiff-chaff, willow warbler, yellow wagtail, and wheat-ear.

Second and third weeks in April:

Swallow, martin, redstart, cuckoo, nightingale, whin-chat, black-cap, tree pipit, common pipit, grasshopper warbler, stone curlew, greater and lesser whitethroats.

End of April and beginning of May: Swift, turtle-dove, quail, corncrake, godwit, sedge; garden, reed, and wood-warblers; spotted flycatcher, and red-backed shrike.

Late May: Common sandpiper, tern, nightjar, pied flycatcher, and marsh warbler.

Winter Migrants.—*Last week in October and first fortnight in November:* Fieldfare, siskin, redwing, snow-bunting, corn-bunting, twite, dotterel, redpoll, and knot.

End of November: Many wild fowl seen on the broads and marshes, such as the teal, widgeon, snipe, sanderling, curlew, and dunlin.

No human tourist, even though he has climbed the almost inaccessible regions of the highest Alps or tried to cross slippery and dangerous glaciers, ever encounters such terrible dangers as those which our little feathered travellers meet with. They invariably cross the sea by night, not from choice, but from necessity. We may suppose that the birds would much prefer to come in from the sea during the daytime, when there

would be many familiar sights on the coast to guide them. But when they approach the land, tired and wellnigh exhausted after their long journey, countless dangers beset them. Hovering around the crags and cliffs are numerous seagulls, and no beast ever attacked its prey more savagely than the gulls attack the smaller migrants. Lighthouse-keepers frequently notice scenes of the most savage butchery when the big gulls swoop down upon the poor little warblers, redstarts, pipits, and other small fry, and catch them in the air. Often the gulls sit on the water and tear their prey to pieces, after which they rise from the waves and pounce, hawk-like, on any of the stragglers. For miles they pursue and capture their quarry; indeed, it is said that if migrants landed on shore by day the smallest birds would be nearly exterminated. Gulls, however, do not fly by night, and so the migrants generally escape their chief foe.

CHAPTER III

THE BAROMETERS

I WONDER how many of my young readers have barometers hanging up in their halls? If you do not possess one of these useful 'weather-glasses' it is certain that you have seen one. How eagerly you watch its movements the day before you are going for your school treat? Long experience has taught your parents to read the barometer very accurately, and though our fickle British climate forbids any reliable forecast of the weather for more than a few hours ahead, yet this instrument is often useful in determining what the weather is likely to be on the succeeding day. Should the mercury rise steadily for several days, we expect fine, settled weather; should it make a rapid 'jump,' the weather will probably be very unsettled, and the mercury may quickly fall again. Just turn to any of the chief daily newspapers, and you will probably see the face of the barometer repre-

sented in one corner of the paper, with the weather forecast printed below.

There are very many ways of prophesying what the weather is likely to be. In some cottage homes the 'old-man-and-woman' barometer may be seen. These wooden figures are placed side by side in a little cardboard house, with a thin partition separating them. By an ingenious contrivance the old man is made to come out of the house when the weather is going to be wet, and the old woman retires inside. In fine weather the figures are reversed, and the old woman is seen displaying her finery in the bright sunshine, while her mate is within.

But there is one class of people who scorn the use of the barometer, or any other artificial instrument, in forecasting the weather. These are the shepherds who spend their lives in the open fields, and who have learnt to read Nature's signals. It is truly remarkable how accurate they are as weather-prophets. And it is well that such is the case. They have to keep careful watch over the young lambs, and in very wet and windy weather they have to provide special shelter for them. Should a storm be expected they will not move the fold until

it has passed over, and if a period of wet and windy weather is probable, they will drive the sheep into that part of the field which is best protected by a hedge or a belt of trees. Probably the chief way in which they forecast the weather is by reading the signs of the sky. You know the old rhyme: —

A red sky at night
Is the shepherd's delight;
A red sky in the morning
Is the shepherds warning.

To them a sickly greenish hue in the sky portends much wind or rain; a grey sky, indicates fine weather; a 'mackerel' sky, dull and cloudy days. A watery moon, especially if there be a ring around it, is a sure sign of bad weather.

For many years an old shepherd whom I knew put all his faith in certain flowers as weather-prophets, and as he had studied several of these little 'barometers' for nearly fifty years, his remarks on the subject may be interesting.

"See this little daisy," he remarked, as he plucked one from the meadow. "This is one of the very best weather-prophets there is. In the bright sunshine it opens as

widely as it possibly can, and faces the sun in its course around the sky. The 'day's-eye' they call it, because its yellow eye is wide open on sunny days. But let a black cloud come along, and there is a great change. This little flower seems to feel the rain long before it comes, and the outside petals wrap themselves around the eye in the centre and form a capital shield." (The old man was wrong in describing the outer rays as 'petals.' The daisy belongs to the composite order of flowers, and each 'petal' is really a little floret, so that each head is composed of many distinct flowers. The outside florets are strap-shaped, and white, while the inner ones are tubular, and yellow. The former are known as *ray florets*, and the latter as *disk florets*. The folding over of the ray florets is to protect the disk florets from cold and wet, and, in addition to folding when rain is approaching, they also fold in the night-time.)

"Another capital little 'weather-glass' is the dandelion. As a rule it stands up boldly in the sunlight, as you see it now, but it quickly huddles itself into a heap when the sky becomes threatening, as though the petals were trying to shield each other from

the rain. If the rain falls on the flower when it is folded up the water quickly runs off, but if it remained wide open the water would stand in the cup and rot the flower. What I want you to notice is that these flowers do not wait for the rain to fall before they close up; they seem to know when rain is coming, and prepare for it." (Here again the old man's knowledge of botany was at fault. Each strap-shaped 'petal' of the dandelion is a perfect flower, having a calyx, stamens, pistil, and seed-box. In the centre of the head of florets there are many tiny green seeds, packed closely in the seed-box, and above the seeds are the stamens which carry the pollen down to the seeds so that they are fertilized. It is necessary that the pollen-dust should be kept as dry as possible, and rain would quickly wash it away, so the florets, by folding themselves up, are really protecting their pollen. Nature makes a plant look after its pollen as carefully as a hen looks after its chicks, for if the pollen be spoilt the seeds will never ripen, and no new flowers will be produced.)

"But one of the best little barometers that I ever saw is the pretty little scarlet pimpernel," he went on. "I may be able to find you

one on the roadside as they are very common round here. We call it 'the poor man's weather-glass,' and a capital weather-glass it is too. It is so sensitive to changes in the weather that it often closes up its little scarlet flowers when the sun is shining brightly in the sky. I have never known it to fail me yet, and I have watched it a good many years too."

"Are there any more barometer plants?" we asked, as he stopped to light his pipe.

"Dozens of them, my boys, dozens of them," he replied. "Some of them bend their stalks over to the ground, and the bell-shaped flowers which are on the top of the stalks hang downwards, so that the water falls on the outside petals and runs off. The sheep-bit (scabious) does this. In damp weather you will see the flowers drooping over and folding up as though they were ashamed of themselves. The herb robert, chickweed, and shepherd's purse act in a similar way."

"Can you tell us why some flowers act as barometers, and others do not?" we inquired.

"Well, it seems to me that it is those flowers which have very little protection

against the rain that do this. Some flowers, such as the sweet-pea, begonia, balsam, calceolaria, and many others, protect their pollen by the shape of their petals, which form a little tent, or roof around it, and so keep it dry. Even some of the wide cup-shaped blossoms, such as the wild rose, apple-blossom, and cherry-blossom, turn their faces towards the ground, so that the water which falls on the calyx runs off. It is not necessary for these flowers to close up; they are always protected against heavy dew or wet weather by their position or the shape of their petals."

We thanked the old man for his information. We had thoroughly enjoyed his pleasant chat. We were quite convinced that these old men who spend nearly all their lives in the open fields know far more of wild nature than those who study the subject from books. Year after year they watch the signs of sky, birds, beasts, and plants, and so they have solved many of Nature's riddles and seen many of her hidden beauties.

CHAPTER IV

THE CANNIBALS

NO doubt many of my young readers have listened to a lecture by a missionary who has spent most of his life in foreign lands, engaged in spreading the Gospel among heathen and savage races. Probably he has related many strange tales of adventure, and you have been filled with horror when he has described the dreadful practices of some cannibal races with which he has come into contact. Nothing to your mind seems more horrible and beastly than the thought of one man killing another and afterwards eating his victim's flesh. Happily the spread of Christianity into nearly all parts of the world has done much to put down cannibalism, but the practice still goes on in a few remote districts into which the white man has not ventured.

But just as there are cannibals among mankind so they are found also among the lower orders of creation. Of course you are quite

aware that many animals kill and eat other animals, which are usually of a different species. Thus pussy preys on mice; the dog looks upon a rabbit, and even a rat, as dainty tit-bits; man-eating tigers relish human flesh and blood; and the savage hyena digs up graves and devours the corpses which he turns up. It is not, however, of these animals that we will speak when illustrating Nature's cannibals. Rather will we turn to plant life to find a few notable examples.

Should you ever go to Australia and come into contact with one of the Australian aboriginals, or native blacks, he might be able to show you a 'cannibal tree.' This tree grows about nine or ten feet high, and somewhat resembles an enormous pineapple. The leaves are extremely strong and grow quite at the top of the tree, where they form a kind of fringe. It is said that natives have been known to commit suicide by jumping down upon one of the strongest of the leaves, which immediately flies together like a trap, and mangles the person's body. An ingenious use is made of this curious power of the 'cannibal tree.' Should the natives wish to kill an animal they perhaps throw it on the top of the tree, and some of the leaves

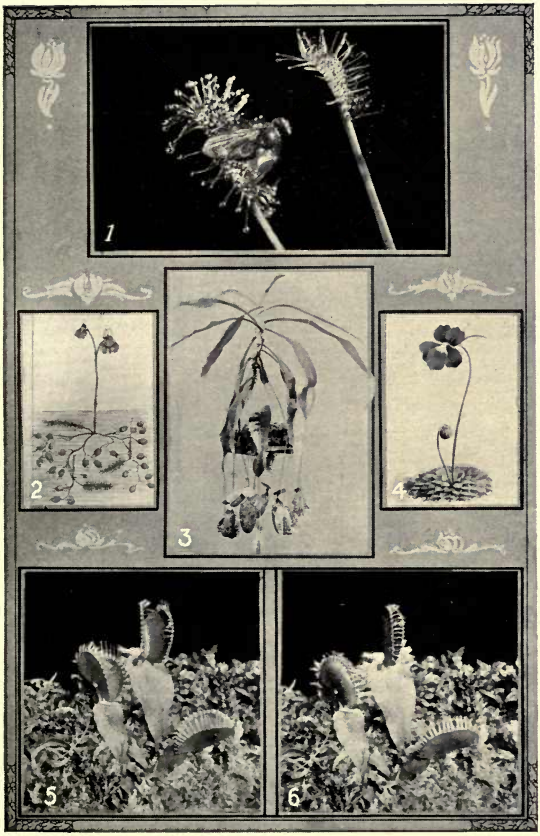
at once close on it, so that it is quickly crushed to death.

By far the best examples of cannibal plants, or *carnivorous plants*, as they are more commonly called, are to be found in the tropics, especially in tropical America. One such curious plant is found in British Guiana. This has the strange name, *Heliamphora nutans*, and it generally grows in boggy and marshy ground. At the base of its pistil there is a cup-like cavity which is filled with a sticky fluid, and any insects crawling down the plant fall into the cup and are drowned. When this happens the dead bodies are absorbed by the plant, and they make very suitable plant-food.

A similar carnivorous plant may be found growing on marshy soil in Great Britain. This is the sundew. There is a rosette of rusty-coloured leaves, covered with reddish hairs, which lie close to the ground, and at the top of the slender stalk there are several small greenish-yellow flowers which are in full bloom in July and August. A characteristic of the leaves is their power of giving out drops of clear sticky fluid, and these attract the sharp eyes of several species of insects. The drops of fluid glisten in the

sunshine almost like dewdrops on a rose-leaf in the early morning, and because of this the plant is called 'sun-dew.' Each tiny leaf-hair is shaped like a club. When the insect settles on the leaf the fluid holds it, and little by little the hairs close round it so that it cannot escape. A digestive juice, very similar to that given out by glands in the human stomach, then acts on the imprisoned insect, and, step by step, the soft parts of its body are absorbed as food by the plant. The bones, wings, and skeleton become dry, and are blown away by the wind. Professor Darwin made a close study of the sundew, and he tells us that a great part of its food is derived from the tissues of insects which have become entangled in the tentacles of its viscid leaves.

Another British 'cannibal' is the bladderwort. This may be seen growing in ditches and pools, and it generally floats on the surface of the water. It is called 'bladderwort' because it has tiny bladders of a transparent greenish hue which are filled with air at the time of flowering, thus causing the plant to rise to the top of the water so that the blossoms may expand above the surface. The bladderwort traps



1. Sundew with newly caught Fly

2. Bladderwort 3. Pitcher Plant 4. Butterwort

5 and 6. Venus's Fly-Trap—Open and Shut

Photos: Martin

its prey by two thin lips which open into the bladder. On the upper lip there is a valve which presses backwards, and as the insects make their way into the bladder they press past the valve, which easily gives to the pressure, but will not allow them to return. Inside the bladder there are numerous cells which are able to suck up and digest the soft parts of the insect's body.

Still another carnivorous plant is the butterwort. This also grows on marshy land, especially near the bogs of Ireland. The leaves are yellowish-green and are covered with soft hairs which give out a gluey substance very similar to that emitted by the sundew. The flower is borne on a long slender stem, and is of a violet colour. Should an insect alight on one of the leaves, which, like those of the sundew, form a rosette at the base of the flower-stalk, the leaf curls up and folds around the insect so that it is a prisoner. In time it dies, and the acid juices given out by glands in the leaf gradually absorb the soft parts of the creature's body. In parts of Sweden the leaves of the butterwort are used to curdle milk, and from this property the plant derives its name.

Another very curious carnivorous plant

grows in Central America. The stalks of this plant are hollow, and shaped like a trumpet. Over the 'trumpet' ends the leaves form lids, but crawling insects push under the 'lid' and descend the stalk. The inner surface of the stalk is covered with numerous sharply-pointed hairs, and when the insect reaches these hairs it is imprisoned as closely as a fly caught in a spider's web. As in other carnivorous plants, there are many glands at the bottom of the stalk, and these give out the digestive juice which enables the plant to absorb the soft tissues of the insect trapped.

Far away on the sandy savannahs of Carolina and Florida that curious plant, known as 'Venus's Fly-trap,' may be found. There is the same rosette formation of the leaves around the base of the flower-stalk as in the sundew and butterwort. The flowers are borne on the top of a naked stalk, and they are of a whitish hue. The leaves are the most curious part of the plant. The leaf-stalk is dilated, and on each leaf there are two lobes, with three short stiff bristles on each lobe. These bristles are very sensitive to touch.

As soon as the unwary fly, butterfly, moth,

or any other small insect touches the leaves, the lobes suddenly close around it and capture it, after which the food is digested in the same way as that 'eaten' by the other plants of which we have spoken.

There are more than four hundred carnivorous plants throughout the world, but we will conclude our remarks with a brief description of the pitcher plant. The best known of the species grows in China and the East Indies, and it derives its curious name from the peculiar formation of its leaves, which are shaped like a pitcher. These leaves are oblong and grow directly from the plant stem, and at their extremities there are hollow vessels resembling the common water-pitcher. These cavities contain a sticky fluid given out by the plant. The pitcher is provided with a lid which opens in the day and shuts at night. Just under the lid and on the inner surface of the hollow there are several fine hairs which bend downwards towards the centre of the cavity. Crawling insects in search of the rich stores of honey contained in the pitcher enter the cavity, and become entrapped by the hairs. The soft parts of their bodies are afterwards acted upon by the digestive juice given out

by glands at the base of the pitcher, and they are gradually taken into the plant as food.

"But why are these plants flesh-eaters?" you may ask. "Our common garden plants do not 'eat' insects. Why should Nature specially fit these plants with traps for catching their food, and then supply them with a digestive juice for assimilating their prey?"

To answer this question it is necessary for you to understand what constitutes plant-food. One very important and indispensable element of plant-food is nitrogen. Nearly all plants obtain nitrogen from the soil by means of their delicate root-hairs. You know that the root-hairs have the power of absorbing many substances, such as lime, soda, and potash, which are contained in the soil in which they grow, while their leaves turn the water and gases into plant-food as well. Professor Darwin stated that the sundew, bladderwort, and other members of this family derive their supply of nitrogen from the tissues of insects—that is, from animal food. The peculiar conditions under which they live and the nature of the ground in which they generally grow prevent them from obtaining sufficient nitrogen for their

needs, and Nature compensates them, as it were, by giving them these strange powers.

Only another example of good old Mother Nature looking after even the humblest of her children, is it not?

CHAPTER V

THE MESSENGERS

WHAT a number of ways messages are transmitted to all parts of the world nowadays! By the telephone we can speak to people who may be hundreds of miles away; the electric telegraph flashes our messages right round the world, if need be; that wonderful invention of wireless telegraphy enables ships to keep in communication with the shore and with one another, even though they be separated by hundreds of miles of sea; for many years we have been able to send letters to all countries by means of the post office; and during the past year an aerial post has been started through the agency of the aeroplane. Thus we can communicate with one another over the land, under the sea, and through the air.

Our ancestors would think they were in fairyland if they could once more walk about the land and see the results of some of

the marvellous inventions of the past century. In their day it took two or three weeks for a letter to arrive at its destination, if it were sent three or four hundred miles. Their messengers were men called 'runners,' who delivered the letter by hand, after having kept up a steady trot along the rough roads and lanes for days and days. Later the stage-coach made its appearance, but how very slow it was when compared with the rapid means of transit to-day!

In this chapter we are going to talk of some feathered messengers. These are the famous homing-pigeons, which some of you may keep.

Have you ever been to a big football match where thirty or forty thousand people have gathered to see two of the 'League' teams play? Maybe the visiting team has travelled three or four hundred miles, and the players have probably brought a few of their supporters with them. Should the team have come from the North of England to the South it is highly probable that one or more of those supporters have brought two or three homing-pigeons with them in a hamper. At 'half-time' they fasten a message to the leg of the bird, and let it fly away. Round and round

it goes, in ever-increasing circles, and gradually it rises in the air to a great height. At last it strikes off in the direction of its home. Over meadow, field, forest, and mountain it flies; through blinding rain-storms, and, maybe, thick fog; but it still keeps on its right course, and, with unerring accuracy, reaches its loft long before its master has returned by train.

What marvellous powers of flight the homing-pigeon has! People cannot quite understand what it is that guides the bird over such a great distance. For you must remember that it was brought all those miles away from its home cooped up in a hamper on a train, when it could not possibly see in what direction it was going.

And how quickly the birds fly too! With the wind behind them they can travel over half a mile in a minute, and the fastest birds have even been known to do over a mile in that short time.

During the week in which this chapter was written a great pigeon race took place at the Crystal Palace, on the outskirts of London. Over 10,000 birds took part in the contest, and they were dispatched to all parts of the kingdom. The longest distance

any bird had to travel was to Scotland, and these birds had to be liberated at daybreak, so that they could have the advantage of the daylight for their flight. Soon afterwards 500 birds were sent away to Cumberland, and at intervals the Yorkshire, Lancashire, and Midland birds were started. At midday, when a large company of spectators had gathered at the Palace, over 5000 birds were set free, and these flew off to their homes in various parts of the South of England. The National Homing Union offered a championship prize of £50, together with a cup, for the owner of the bird which made the best flight. As soon as the birds reached home their owners had to telegraph to the secretary of the Society the secret number stamped on each pigeon's wing, and the awards were given according to the air-line distance flown.

During the racing season, which extends throughout the summer, a special train leaves King's Cross railway station every Friday night which is loaded entirely with pigeons. These are taken to the Midlands and North of England where they are liberated from their panniers for their flight home. Pigeon-racing in the Potteries and North of England

has lately become quite a popular sport, and several centres of the National Homing Union have been established in the large towns.

Sometimes the birds are unable to find their course, but they generally manage to reach home, even though there be several days' delay. A remarkable instance of the long absence from home of a carrier-pigeon was related a few months ago in the newspapers. A bird belonging to a Southampton sea captain was released, with several others, from Jersey, one of the Channel Islands, in June 1909. For over a year the bird was missing, and it was thought that it had lost its course and settled on an outward-bound vessel. This proved to be the case, and it was taken care of by some one, who, on returning to England, set it free. When the bird did at length reach its home it remained on the roof of the house, and refused to go to its loft for food. At last, however, hearing its owner's voice, it flew down to its old place, and was quite at ease again. When the captain examined its legs he found on them the rings which bore the official stamp of the society which released it in Jersey.

Another instance of a homing-pigeon

taking a wrong course is known to me personally. When I was a boy I kept between forty and fifty pigeons, and one day I noticed a stranger among them. When night came the visitor went to roost with the other birds, and I caught it. On examining its wing I found the owner's name and address stamped on it, and next day I wrote to him, telling him that I had his bird and asking what I was to do with it. The bird's home was at Croydon, and at that time I was living near Bury St Edmunds, in Suffolk, so that the distance between the two places was considerable. By return of post I had a letter enclosing a postal order for half a sovereign, with instructions to send the bird back in a hamper which was being sent on. The owner informed me that the wanderer was a prize bird, and his mind was much relieved over the recovery of his pet.

King George V takes great interest in homing-pigeons, and he has some beautiful birds in the lofts at Sandringham. Before he was king he made a tour around the world, and when he visited Auckland, in New Zealand, the inhabitants of Great Barrier Island, nearly sixty miles away,

wanted to send him a greeting. They had no certain means of doing so, but at last some one thought they could send their message by a pigeon. The bird arrived quite safely, with the following message attached to it:—

T.R.H. The Duke and Duchess of
Cornwall and York.

Government House,
Auckland.

The inhabitants of Great Barrier Island desire to offer the warmest of welcomes to your Royal Highnesses on your arrival in New Zealand. Though cut off by some fifty-eight miles of sea, without telegraph and with but few steamers, we are able to communicate with Auckland by means of homing-pigeons, and take advantage of one to inform you of our hearty loyalty and devotion to the Empire.

It is said that the King was delighted with the novel method employed to send this message, and he ordered photographs of the letter to be taken.

CHAPTER VI

THE POISONERS (ANIMALS)

WHAT a dreadful subject this is to talk about!" you will say. "Poisoners are horrible people, often murderers; and many people have lost their lives through accidentally taking poison. Of course we know that certain poisoners get a good living, such as rat-poisoners, who go down to the docks and enter the vast hulls of the huge vessels, where they kill hundreds and hundreds of rats; but which class of animals or plants can we rightly describe as poisoners?"

It will not take us long to find a few poisoners, even in England. Boring their way into the ripe fruit in autumn are many active little wasps, which poison us by their sting. Bees, too, are armed with this deadly weapon, and the hornet, which makes its nest in hollow trees and walls, is able to poison our blood by its powerful sting, so that there is considerable swelling and great

pain. Cases have been known where a number of hornets have attacked boys and girls and stung them to death.

The sting of a bee is more serious than that of a wasp, because the bee-sting almost invariably remains in the wound, while the wasp probably withdraws its sting for use on a future occasion. A short time ago a friend of mine visited his beehives for the purpose of removing the sections of honey. He took the precaution to cover his face and neck with a muslin veil, and also to wear long gloves. Armed with a 'smoke-puffer,' he approached the hive, and prepared to take the sections. The puffer did not work properly, and as the day was very close, with thunder-clouds hanging around, the bees were especially fierce, and they savagely attacked him. One or two of the more daring crawled beneath the veil and stung him very badly on the neck and face. He beat a hasty retreat, and when he afterwards examined his gloves he pulled no less than forty stings out of them. His wife removed the stings from his throat and face by pressing the end of a watchkey over them, when they stood out from the flesh so that they could be pulled out by the finger and

thumb. The wounds were then squeezed until a drop of blood oozed out from each, and the injured parts were afterwards rubbed with onion juice. When this had dried up, some ammonia was painted on them, and soon all the ill-effects were gone. Should you be stung by a bee or wasp you should rub the wound either with ammonia or vinegar. Soft soap also may be used if the other remedies cannot be obtained.

Though the bees, wasps, and hornets have powerful and deadly stings, yet they are only weapons of defence. If the insects are left alone they rarely harm anyone. Dame Nature did not provide them with these useful weapons for the purpose of attacking people, but rather to defend themselves against the attacks of their enemies. And very serviceable weapons they are too, are they not?

Some people suffer far more from the stings of gadflies, mosquitoes, gnats, and other poisonous insects than others do. In a warm summer evening there are numerous little yellow-brown flies flying about near trees and shrubs. Probably one of these mischievous little creatures settles on your face, neck, or hand, so lightly that you do

not notice it until it gives you a sharp prick, and even then it does not greatly trouble you. Soon a little red place appears on the skin, with a slight swelling, and in a few minutes it itches. You scratch the place, but this rather makes the itching worse. Little by little the redness of the skin spreads up the arm; the harmful poison, greatly helped by the scratching, is doing its work, and if your blood be in bad order blood-poisoning may set in, and a serious illness follow. If, instead of scratching gnat, fly, and mosquito-bites, the sufferer were to dip the affected parts into water as hot as he could bear it, the swelling and discomfort would rapidly disappear.

Our dumb friends, especially the horse and ox, are greatly tormented by other insect poisoners called bot-flies or warble-flies. There are several varieties of bot-flies. One species, the horse-bot, attacks the horse. This creature lightly settles upon those parts of the horse's body which the horse often licks, and lays its eggs there. The eggs stick to the animal's tongue and pass down into the stomach. The heat soon hatches them, and the grubs feed on the horse's intestines. The ox-bot poisons parts of the body of the ox.

At the end of the female's body there is a sharply-pointed tube, called an ovipositor, and the creature can thrust this in and out somewhat like a bee uses its sting. Perhaps an ox may be peacefully grazing in the meadow. Along comes the ox-bot, and gently settles on the animal's back. Soon she darts her ovipositor into the flesh, and lays an egg in the tiny hole. The poor ox knows well what is going on, for it rushes wildly about, throws out its tail, and seems to be almost mad with terror. In time the egg will hatch into a tiny larva or grub. The grub feeds on the flesh, and so irritates it that a large lump is soon seen on the injured part. This lump is known as a 'warble,' and it is really a sore containing matter. The grub actually lives on this matter until it is fully developed, after which it drops to the ground and quickly forms a chrysalis, when, in due course, it will change into a perfect insect, ready to attack another animal in the same way as its parent had done.

Fortunately we in England are not affected by poisonous insects so much as the people are who live in tropical countries. The bite of the dreaded tsetse-fly, which lives in Africa, is often fatal to horses, dogs, and other thin-

skinned animals. Mosquito-bites are also very harmful, and people, in many warm countries where the mosquito makes its home, have to sleep with veils over the exposed parts of their skin, or they would be badly bitten. It has recently been discovered that the mosquito is the chief means of spreading the terrible yellow fever. Certain species of mosquito exist in England, but they are not nearly so harmful as their African and American cousins.

In our list of Nature's poisoners we must certainly include the snake, for some varieties of snakes are the most deadly poisoners in the world. Many people have the erroneous idea that snakes 'sting,' and I have heard boys in the Reptile House at the Zoo, exclaim, "Look at its sting!" when a snake has thrust out its forked tongue. This long black tongue has no sting, and it is quite as harmless as your own tongue.

If you could see inside the mouth of a banded rattlesnake which has not been kept in captivity, you would notice a pair of long fangs which curve backwards and downwards from the upper jaw. Closer examination would show you that the fangs are not real teeth embedded in the jawbone, but that

they are held in position at the roof of the mouth by bands of skin and muscle. When the mouth of the reptile is shut the muscles relax, and the fangs lie back against the roof of the mouth. As soon as the mouth is widely opened the fangs are pulled quite upright, in a position for striking. Could we carefully examine one of the fangs under a microscope we should find a tiny hole near the tip, and this hole extends all down the middle of the fang to the base. At the base there is a small bag, or *sac*, containing the venom. When the reptile strikes its victim the fangs are thrust into the flesh and make two tiny holes. Pressure on the fangs causes the bag of venom to be squeezed, and some of the poison is squirted out through the hollow fang down into the wound.

The bite of the rattlesnake is not so deadly as that of the cobra, which is found in Southern Asia. You would know this snake by the curious marking on the back of its neck, and also by its habit of spreading out the skin on the sides of the neck when it is irritated, raising the front portion of its body in an upright position, and expanding its hood. The bite of the hooded cobra is probably one of the most deadly bites that

can be inflicted by any creature in the world. Unless the stricken person can burn out the wounded part of his body, or get some one to amputate the bitten limb, death follows within a few hours. In India the cobra is a deadly scourge, and thousands of the natives lose their lives through this reptile's bites.

Happily in England we are not molested by these venomous reptiles, for the only ones that exist in this country are those found in captivity in the various zoos, or carried from town to town by 'snake-charmers.' In the case of the latter the poison fangs have invariably been destroyed, so that the creature is no more deadly than a common worm, although the charmer, when he is making the puff-adder dance, would have us believe that he is in deadly peril all the time.

There are only three species of snakes found in Britain. These are the ring or grass snake, smooth snake, and viper. The smooth snake is very uncommon. The viper only is venomous, and its bite is seldom fatal. Should you be bitten by a viper—and the creature would not bite you unless you attacked it—you would doubtless be

greatly frightened, but the only discomfort you would probably experience would be a slight swelling of the affected part, with redness of the skin, and a pain resembling that from a bee-sting. If the bitten part were well rubbed with ammonia, in a few hours all signs of the wound would have disappeared.

There are several points of distinction between a viper and a grass snake. The viper's head is broad in front, and there is a faint V-shaped mark on it. The grass snake's head is rather narrow and pointed, and there is no distinguishing mark. Along the viper's back is a zigzag black line reaching from head to tail. The ring snake is of a greyish colour, marked with a few black patches. And, of course, the viper has poison fangs, while the grass snake has none.

CHAPTER VII

THE POISONERS (PLANTS)

IN the last chapter we spoke of animal poisoners, such as the venomous reptiles, and several poisonous insects. Possibly some of my young readers who have had a course of lessons in nature-study may have heard of a class of plants called poisonous plants, and it is of these plants that we will speak in this chapter.

The most common poisonous plants, which may be met with all over the country-side, and, indeed, under cultivation in some gardens too, are the foxglove, monkshood, buttercup, deadly nightshade, woody night-shade, hemlock, fool's parsley, common bryony, meadow saffron, cuckoo-pint, and yew. Some of these plants bear poisonous berries, others contain their poison in their leaves, while a few have poisonous roots.

But in nature there is a use for everything. You have been told, and quite rightly too, that you must on no account eat the berries

of the nightshades, yew, or bryony, but under the chemist's treatment these berries, which would do you so much harm in their natural state, are made into valuable drugs. The poet reminds us of this when he says:—

The foxglove leaves, with caution given,
Another proof of favouring Heaven
Will happily display:
The rabid pulse it can abate;
The hectic flush can moderate;
And, blest by Him whose will is fate,
May give a lengthened day.

Probably some of you have a monkshood growing in your garden. For hundreds of years this plant grew wild, but it has such a pretty flower that gardeners have cultivated it, with the result that its petals are much finer, and it is a decided ornament to the garden. It is a member of the buttercup family, as you can see if you examine its leaf. The shape of the flower somewhat resembles that of the hood worn by the monks in olden times, and from this it takes its name. The poison is contained in the root, which in shape and size, is very much like a horse-radish. A valuable medicine called *aconitine* is extracted from the plant, and this suggests its second name, *aconite*.

This medicine is largely used by doctors to relieve neuralgia. Many years ago, when wolves inhabited these islands, an enticing bait of monkshood was laid for them, and because of this the plant was then known as *wolf's bane.*

Quite one of the most deadly poisonous plants we have is the deadly nightshade. This plant grows from four to six feet high, and is found on the hedgerows and waste places. It may often be seen in a disused part of the garden where rubbish of all kinds has been heaped. The plant is a perennial, and belongs to the same natural order of plants as the potato. The leaves are egg-shaped, and of a dull green colour. The berries, which follow the small bell-shaped flowers, are purplish-black, and about the size of a cherry. These berries, indeed, have been mistaken by children for black cherries, and cases have been known where they have even been cooked in a pie. Should you eat several of the berries your throat and mouth would soon become very dry and parched, and there would be great difficulty in swallowing. When the poison took still greater effect your face would become flushed and feverish, and your eyes

would be unnaturally bright and sparkling, although your eyesight would be blurred. In time you would probably become delirious. This would be followed by extreme drowsiness, hurried breathing, and a rapid beating of the pulse. Convulsions would occur, to be speedily followed by death.

Of course all the above symptoms occur only in very severe cases of poisoning, such as when some one has had a good feast from the raw and tempting berries as they hung on the shrubby plant. Indeed, cases have been known where a boy has eaten forty of the berries without fatal effects, although for a long time he was in great danger of losing his life. On no account touch these berries, however tempting they may look. Chemists make a powerful drug from the plant, called 'belladonna,' which is used in the form of a pill, or as an ointment, or in a liquid state. Doctors use it to relieve inflammation of the eye, and also to dilate the pupil. Because of the latter effect, and also because of the sparkling appearance it gives to the eyes, the liquor is frequently used by actresses. In time, however, this practice has a very harmful effect, and may impair the sight. It is because of its beautifying effects that the

plant is commonly called 'bella donna,' which is the Italian for 'fair lady.'

Another plant which bears berries that are very enticing to children is the woody nightshade, or bitter-sweet. This plant is a climber, and may often be seen clinging to the trunks of some of the woodland trees. The leaves are heart-shaped, and bear an unpleasant odour; the flowers are purple, and of a conical shape; and the berries are red. The berries are about the size of currants, and when ripe may be mistaken for red currants. They are not so poisonous as those of the deadly nightshade, but if several of them be eaten the throat would be irritated, and there would be great thirst, with burning pains in the stomach. Much vomiting would follow, and in severe cases stupor, convulsions, and delirium may set in. Should you ever eat any of these berries by mistake, you should take a strong emetic of mustard and water as soon as possible.

The purple foxglove, now to be seen under cultivation in many gardens, is a handsome flower, and quite one of the most beautiful of our wild flowers. Its flowers resemble in shape the finger of a glove, and on their insides there are velvety purple and

white markings which entice the big humble-bees. Though the plant is poisonous, yet a valuable medicine is extracted from the leaves, called *digitalin*, which is often used in affections of the heart. Digitalin acts upon the heart by increasing the force of its beat, or in other words, causing the heart to work harder.

The hemlock, which grows in waste places, on banks and under walls, very much resembles parsley. It has a tall, smooth, and shining hollow stem, with purplish spots, and the leaves are deeply notched, and pinnate. The flowers, which are of a dirty white colour, grow in umbels at the top of the stalks. When the stem and leaves are bruised they give out sap very freely, which has a very unpleasant odour. Sometimes hemlock leaves have been mistaken for parsley; and boys have been known to make whistles of the hollow stems, with sometimes very harmful effects. Cases have been known where boys have died through blowing hemlock whistles. All parts of the plant are poisonous. Should anyone suffer from hemlock poisoning one of the first symptoms would be a staggering gait, as though the person were drunk. Violent sickness might follow, with burning pains in

the mouth and throat. The muscles seem to have no power, and in very severe cases intense drowsiness sets in. Finally, all the muscles become paralysed, and the lungs and heart refuse to work, when, of course, the sufferer dies. Socrates is generally supposed to have been put to death by a decoction of hemlock.

The laburnum is a very pretty flowering shrub found in many parks and gardens, but the bark, leaves, pods, and seeds of the plant are all poisonous. Sometimes children eat the seeds of the laburnum, thinking they are peas because they grow in a pod. If many are eaten the person would be very sick, and have great pains in the stomach. Death is sometimes caused by eating freely of laburnum seeds.

The pretty cuckoo-pint, or, as you prefer to call it, the parson-in-the-pulpit, or lords and ladies, bears many brightly coloured berries which are poisonous. You must have seen these berries standing around the base of the purple poker which is enclosed by the large bell-shaped leaf, as the plant is very common in shady woods in damp hedge-rows. By no means should you eat the berries. If you did, your mouth would have

a burning sensation, and your tongue would be greatly swollen. Even worse effects than these have been known to follow poisoning by the cuckoo-pint.

The meadow saffron, or autumn crocus, is more frequently poisonous to cattle than to human beings, as cows, sheep, and other browsing animals often eat its leaves. The flower has a reddish colour, and resembles a crocus. It may be found in pasture-lands.

The buttercup is another common flower which disagrees with the mouths and tongues of the animals which eat it, and because of this it may often be seen standing erect in the pastures when the grass has been grazed quite close to the ground.

However tempting the richly coloured berries of the yew-tree are, leave them alone. Their seeds are poisonous, and fatal effects have resulted to children who have eaten these berries.

The common bryony, which may be found climbing over the hedgerows in many country lanes, and which has large and light-coloured leaves, bears poisonous red berries. Privet berries, growing on privet hedges, have also been responsible for the poisoning and death of boys and girls who have eaten them.

This completes our list of common poisonous plants, but we must briefly refer to the numerous varieties of toadstools, because cases occur every year of whole families eating one or more of these varieties in mistake for mushrooms. The chief points of distinction between a mushroom and a toadstool which you should look for are:—

1. There is always a collar, or ragged edge, on the stalk of a mushroom. In many toadstools this is missing.
2. The gills or 'blades' of a mushroom do not join the stalk. There is always a space between them. In several species of toadstools the gills do join the stalk.
3. The skin from the top of a mushroom can readily be peeled off in flakes. In a toadstool this cannot often be done.
4. In young mushrooms the gills are pink; in older mushrooms they change to a purple colour, but they are never black. The gills of several species of common toadstools are quite black.
5. The mushroom has a pleasant, 'fresh' odour. The odour from most toadstools is very unpleasant.

The Poisoners

It will be seen that none of these distinctions by itself is a thoroughly reliable test of a mushroom. Indeed, if mushrooms are found in a wild state children should always have them carefully examined by their parents before eating them. Most grown-up people who have been brought up in the country know at a glance whether the fungus is a mushroom or not, but one cannot be too careful in the matter, as many species of toadstools are highly poisonous.

CHAPTER VIII

THE MILLINERS

NO doubt most of my boy readers will not be greatly interested in the subject chosen for this chapter, but it is quite certain the girls will especially want to find out something which applies almost entirely to their sex. It is quite probable that some of the girls who read this chapter will serve in a milliner's shop when they grow up, and if so they will have the handling of the costly feathers and plumes of which we shall speak.

Now it is my unpleasant duty to say some very harsh things of the ladies in connexion with millinery. I say 'duty,' because anyone who writes books on natural history, and who, therefore, must have a love for Nature and her children, feels it his bounden duty to point out abuses of Nature, or persistent cruelties to any members of her large family.

Ladies, we like to think of you as gentle

and kind; tender-hearted to the sufferers, sympathetic to those in distress. 'Ministering angels' many of you have been in times of sickness, and that familiar picture of 'The Lady of the Lamp,' which shows us Florence Nightingale tending the stricken soldiers in the hospital at Scutari, brings before us a high ideal of womanhood.

But in one matter many of you are guilty of the most barbarous cruelty. You practise the customs of half civilized races; some of you bedeck yourselves with the entire stuffed bodies of certain gorgeous birds, little thinking that it is at the cost of those birds' lives, and probably their nests of young ones as well.

Let me give you an example of your cruelty by telling you a little story. Long, long ago in prehistoric Britain one of the British women possessed a dear little baby, at the time of my story about three weeks old. Like all mothers, she was extremely fond of her baby. For hours and hours she would croon sweet songs to it, and attend to its every want. In time one of the savage chiefs came along in a great rage, for he had broken the handle from his axe-head. There

were plenty of other handles which he could obtain, for he lived in a clearing of the forest, but how was he to fasten the axe to the handle, or haft it, as it was called? Just then he saw the woman sitting at the door of her hut, fondling the babe at her breast. Hanging down her back were long tresses of hair. The savage chief strode up to her and demanded her hair, in order that he could haft his axe-head. She refused to give it to him, and a great struggle took place. The woman flew at him like a tigress, bit him, kicked and scratched him, but it was of no use. The superior strength of the chief at length prevailed, and the poor woman was left dead at the side of her little one. Her beautiful tresses had been ripped from her head, and the baby was motherless. No one would care for it. It would cry for its mother all day long, and gradually it would become weaker, weaker, weaker, until it joined its mother in death.

"Now what has this story to do with us?" you ask. Simply this; it is a little parable which may well be applied to many ladies who wear the beautiful aigrettes of the egret, or white heron. A short time ago there was

a remarkable picture in some of the illustrated papers showing a nest of young egrets loudly clamouring for their mother. Where was she? Lying dead beside the nest with all her rich plumes torn from her. The hunters are not to blame. They can make from £8 to £10 an ounce for these plumes, and they have their living to get. The milliners are not to blame, for they have to satisfy the needs of their customers. Then who is to blame for the wholesale slaughter of such beautiful birds as the bird of paradise, egret, osprey, and lorikeet? *Simply the ladies who wear the plumes.* If there were no demand there would be no supply.

It is well known that the plumage of birds is at its best during the mating season and nesting-time. Then it is that the birds are stripped of their costly plumes. In some cases the birds are killed outright, and this is generally the case with the egret. In other cases, as with the ostrich, the plumes are plucked. When the young ostrich is about six months old it is first plucked, but the plumes from a bird of this age are of poor quality, and worth only about five or six shillings. Eight months from this time the

feathers will have grown so that the bird can be plucked again, and so on, so that there are three pluckings in every two years. Often a careless shearer, in his anxiety to get as much of the wing-stalk as possible, will cut through small blood-vessels at the roots of the feathers. But of late years so much public attention has been called to this matter that great improvements have been made in the methods of removing the feathers, and, instead of being plucked quite out of the bird's body, they are sheared off, and if this is carefully done the bird feels little discomfort.

For many years Queen Alexandra has done a great deal to discourage the wearing of birds' feathers, both by her example and by her words. The Queen is a patron of the Royal Society for the Protection of Birds, and the following is a letter from her secretary to the president of the society:—

"The Queen desires me to say, in answer to your letter, that she gives you as President full permission to use her name in any way you think best to conduce to the protection of birds. You know well how kind and humane the Queen is to all living creatures,

and I am desired to add that Her Majesty never wears osprey feathers herself, and will certainly do all in her power to discourage the cruelty practised on these beautiful birds."

Some time before this, in the reign of Queen Victoria, the British Government forbade the officers of certain regiments in the army to wear aigrettes in their helmets. But notwithstanding the example of the Queen, the admirable work of the Royal Society for the Protection of Birds, and Government Orders, the wearing of osprey plumes and aigrettes seems more popular than ever. Happily at the time of writing this chapter there is a Bill before Parliament which seeks to prohibit the wearing of bird-plumage, and if this Bill be passed, as all true lovers of Nature hope it will be, our feathered friends at least will not suffer from the vanity of thoughtless women.

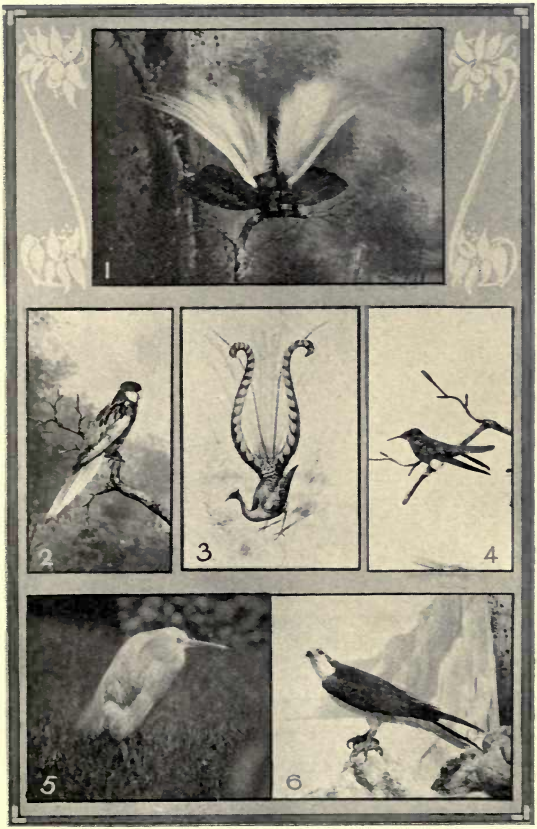
Let us now see where some of our bird 'milliners' live. The ostrich, of which we have already spoken, is reared on farms in South Africa, where it is also found in a wild state. Attempts have been made to rear it in Australia, Egypt, and South America, but they have all been failures, as

the climate of South Africa only appears to suit the bird.

In South America the heron, which supplies the beautiful 'osprey' plumes, finds its home, while the egret, another species of heron, also lives in South America, as well as in parts of Europe. Strictly speaking, the plumes from herons should not be called 'osprey,' but 'aigrettes,' for the osprey is quite a different bird from the heron. An osprey is a kind of hawk which is found near the shores of great rivers and lakes, both in the Old and New World, and its plumage is of a rich brown colour, with pure white in the tails of the old birds.

The beautiful bird of paradise inhabits New Guinea and the adjacent islands. It is quite one of the most beautiful birds in the world, but it is rapidly being exterminated. In fact, the king bird of paradise is now very rare, as its magnificent plumage is so costly that the bird has been remorselessly hunted down. It is celebrated for its gorgeous plume of feathers, which spring up from under the wings and arch over its back and tail. It is the male bird which supplies the feathers.

Another bird much sought after during



1. Bird of Paradise
2. Lorikeet
3. Lyre Bird
4. Humming-Bird
5. Snowy Egret
6. Osprey

the breeding-season is the Australian lyre-bird. This bird is so called because of the remarkable arrangement of the feathers in its tail. The feathers are of three different varieties, and in their shape and arrangement they resemble the lyre of ancient Greece. The bird is rather smaller than a pheasant.

Two birds whose stuffed bodies are worn whole are the humming-bird and lorikeet. The former lives in tropical America, and the smallest of the species are about the size of a humble-bee. The plumage of the tufted-necked humming-bird is very brilliant. The plumes of the neck and the crest are of a reddish chestnut, tipped with green; the throat and breast are emerald-green, and the back, bronze-green. The lorikeet is a small Australian bird belonging to the parrot family, and it is famed for its fine tail feathers. Of late years the mounted bodies of parakeets have been much in popular favour among milliners, but the glassy stare and rigid bodies are quite travesties of Nature.

Three English birds which supply head-dress of a cheaper kind are the pheasant, partridge, and kingfisher. Only in the

latter case are the birds killed solely for their plumage. The feathers of the pheasant and partridge either fall from the birds when they moult, or they are removed when the birds have been shot by the sportsman's gun.

CHAPTER IX

THE NIGHT-WATCHMEN

In the hollow tree, in the old grey tower,
The spectral owl doth dwell;
Dull, hated, despised, in the sunshine hour,
But at dusk,—he's abroad and well!
Not a bird of the forest e'er mates with him,
All mock him outright by day;
But at night, when the woods grow still and dim,
The boldest will shrink away!
Oh! when the night falls and roosts the fowl,
Then, then is the reign of the hornèd owl!

And the owl hath a bride who is fond and bold,
And loveth the wood's deep gloom;
And with eyes like the shine of the moonstone cold,
She awaiteth her ghostly groom!
Not a feather she moves, not a carol she sings,
As she waits in her tree, so still;
But when her heart heareth his flapping wings,
She hoots out her welcome shrill!
Oh! when the moon shines, and dogs do howl!
Then, then is the joy of the hornèd owl!

Mourn not for the owl, nor his gloomy plight!
The owl hath his share of good;
If a prisoner he be in the broad daylight,
He is lord in the dark green wood!

Nature's Workers

Nor lonely the bird, nor his ghastly mate,
They are each unto each a pride;
Thrice fonder, perhaps, since a strange dark fate
Hath rent from all beside!
So, when the night falls, and dogs do howl,
Sing, ho! for the reign of the horned owl!
We know not alway
Who are kings by day,
But the king of the night is the bold brown owl!

BARRY CORNWALL

AFTER you have read this charming little poem that Barry Cornwall wrote describing the owl you will quickly recognize which of our lowly workers we have chosen as Nature's night-watchmen. When we are snugly tucked up in our cosy beds, and are far away in the land of dreams, then our screeching friends are skimming the meadows that skirt the woodlands and hovering over their prey, which their sharp eyes have detected far beneath them. These birds are frequently called the 'pirates of the night,' and woe to the little field-mice which come within sight of them:—

An owl, that in a barn
Sees a mouse creeping in the corn,
Sits still, and shuts his round blue eyes,
As if he slept, until he spies
The little beast within his reach,
Then starts, and seizes on the wretch.

The Night-Watchmen

The most common owl found in this country is the barn, or white owl. You would easily recognize it by its white face and light tawny yellow plumage. It is just over a foot in length. This bird, like all its relatives, is specially fitted for night-work. The head is large and protected by soft warm feathers, and the eyes are extremely well developed. Round the eyes there are circular tufts of feathers, and these help to concentrate the dim light to the pupils. The ears are exceptionally large, and so these birds can detect the slightest sound. In many cases owls discover their prey by hearing it moving about in the corn or grass. The plumage of these night-birds is very soft, so there is little friction when they fly about, and therefore no noise. They invariably fly very slowly. The barn owl makes a dreadful screeching noise, and it is thought that it does this to terrify its prey. Grahame, the Scottish poet, describes this owl well when he says:—

But hark!
That dismal cry! It is the wailing owl.
Night long she mourns, perched on some vacant niche,
Or time-worn crevice; sometimes to the woods
She bends her silent, slowly moving wing,
And on some leafless tree, dead of old age,

Sits watching for her prey.
Oft in the hurly of the wintry storm,
Housed in some rocking steeple, she augments
The horrors of the night.

Very often this owl is associated with ghosts and graveyards because of its wailing noise, and also because it frequently makes its home on the top of a church-tower. Sometimes it chooses barns in which to make its nest, and so it derives its name, the *barn* owl. It lays about four eggs, of a dull white colour and nearly circular shape. You may often know where there is an owl's nest by finding undigested pellets of fur and feathers which have been thrown up by the young ones. Barn owls are far more numerous than any of their relatives, and they are found in almost every country of the world. You would easily distinguish them as birds of prey by their short, strongly curved and hooked beaks. Mice, rats, and nocturnal insects form their chief food.

The tawny, wood, or brown owl is about two inches longer than the barn owl, and its coat is of a darker brown colour. This bird utters a much more pleasing note than the blood-curdling screech of its relative. The

sounds may be imitated by the syllables 'tu-whit, tu-whoo.'

> *'Tis the middle of night by the castle clock,*
> *And the owls have waked the crowing cock.*
> *Tu-whit! Tu-whoo!*
>
> COLERIDGE

The tawny owl generally selects a hole in an ivy-clad oak, elm, or ash tree in which to make its nest, and it nearly always lives in thickly wooded districts.

The long-eared owl, so called because of the elongated horn-like tufts of feathers on its head, has a note very similar to the wail of a cat. The eyes are very prominent and of a yellowish tinge. This bird also lives in the woods. Its plumage is very similar to that of the tawny owl. It nests in holes of trees, and its eggs are of a more oval shape than those of its relatives.

The short-eared owl is more often seen on heaths, moors, and over the open pasture lands, and it sometimes flies by day. It is not generally seen in or near woods, and it rarely rests on a tree. This bird may be distinguished by its long black tail, which is faintly barred.

Perhaps you have always associated the owl with something which is cruel, and

more or less a pest to society. This is quite a wrong idea, though, for the owl renders us the greatest service in keeping the small rodents, such as mice, rats, etc., within bounds. It has been called 'a cat on wings,' partly because of its cry, and also because of its cat-like habit of pouncing on its prey. It does not seem to be a great favourite with other birds, and possibly this is why it keeps out of the way in the day-time, and goes to sleep. Do not think that the owl cannot see in the day-time; its vision is quite as keen then as that of any other bird. True, it peers and blinks in the sunshine, but it has this same habit in the darkness.

CHAPTER X

THE DOCTORS

Excellent herbs had our fathers of old—
Excellent herbs to ease our pain—
Alexanders and Marigold,
Eyebright, Orris, and Elecampane,
Basil, Rocket, Valerian, Rue,
(Almost singing themselves they run),
Vervain, Dittany, Call-me-to-you—
Cowslip, Melilot, Rose of the Sun.
Anything green that grew out of the mould
Was an excellent herb to our fathers of old.

RUDYARD KIPLING

THE famous poet who wrote this verse gives us a delightful description of the practices of our ancient forefathers who cured many of their maladies by the use of herbs. The herbalist is still believed in by many people who live in Lancashire and other northern counties, but those of us who live in the south of England often unkindly call him a 'quack.' Modern science has found a much better use for herbs than that known by our ancestors. Under

the skilful treatment of the chemist the various herbs are prepared in the form of lotion, ointment, pill, and liquid medicine, so that they alleviate many of the bodily pains which we endure.

Have you ever thought that most of that nasty medicine which the doctor gives you to drink when you are ill was once some plant growing out of the soil? Should you be feverish you probably take a mixture containing quinine, and quinine is prepared from the bark of the cinchona-tree, which grows on the slopes of the Andes, in Columbia, Peru, and Bolivia. So useful has this valuable medicine become that the cinchona-tree has of late years been cultivated in India, Ceylon, and Jamaica. If you suffer from sore throat, a very common ailment among children, the chemist probably gives you some marsh-mallow lozenges, and if you have a bad cough you may have to take an infusion of colt's-foot. Myrrh, which is a gum resin given out by a shrub growing in Arabia and Abyssinia, is used in attacks of bronchitis. Many of the country people to-day are firm believers in horehound tea as a remedy for a bad cold on the chest. That horrible mixture called 'ipecacuanha wine,'

which many of you had to take when you were babies if you had an attack of croup, is prepared from the dried roots of a plant which grows in Brazil and other parts of South America.

If we spoke of all the plant 'doctors' we should fill a book twice the size of this, so we shall have to content ourselves with a description of a few of the most common medicinal plants found in this country. Shakespeare wrote of these plants as follows:

> *O, mickle is the powerful grace that lies*
> *In herbs, plants, stones, and their true qualities;*
> *For naught so vile that on the earth doth live,*
> *But to the earth some special good doth give.*

A short time ago I was standing in the market-place of one of our large provincial towns, and a negro herbalist was addressing a crowd on the advantages of taking herbs as medicine. He said that his mother was born in Central Africa, and lived there all her life. She never saw a white man or woman, and never had a doctor. When she and the rest of her tribe fell ill, they went out into the wilds and woods and procured the medicine which Nature had provided for them. All sorts of ailments succumbed to these remedies. He pointed out that our

Bible says, "Grass for the cattle, and green herb for the service of man"; and hundreds of years ago our forefathers knew of no other remedy than that which they could find in the open fields. Some of us, though, who had a knowledge of botany, thought what madness it would be for most people to go out into the fields and gather the berries and leaves from many medicinal shrubs, for, as we saw in Chapter VII, many of these plants are highly poisonous until they are prepared for use by the chemist.

One of the best known of our medicinal plants is the feverfew. This plant is a biennial, and belongs to the same family as the daisy and dandelion—that is, it is a composite plant. The root is long and carrot-shaped, the stem is thin, branched, and upright, growing about two feet high, and the leaves are of a hoary green colour, with several deep notches in them. The plant grows in waste places and near hedges. It bears its rather curious name because in the olden times it was largely used as a remedy for fever. The monks called it 'febrifuga,' for they said fevers were few and flew away when this plant was used. One old writer says of it: "Fedderfew dryed and made into

powder, and two drammes of it taken with honey, or any other drug, purgeth by siege Melancholy; wherefore it is very good for such as have the giddinesse and turning in the head or swimming; for them that are troubled with shortnesse of winde, and for melancholique people, and such as be sadde and pensive and without speach. The greene leaves, with the flowers of fedderfew stamped, is good to be layde to the dissease called the wilde fyre, or Saint Anthony's fyre."

A very useful plant 'doctor' is the marshmallow, which is found in damp places near the seashore. The leaves and stem of the plant are covered with a soft down, which gives it the appearance of being covered with hoar-frost. It grows about four feet high, and bears flesh-coloured flowers which grow on the stem after the fashion of the flowers of the hollyhock. In the preparation of medicine the root is principally used, and poultices of the bruised root often relieve inflammations of the skin. A useful ointment is also prepared by boiling the freshly cut leaves with lard. Demulcent lozenges are made as well, and these are used for affections of the throat and chest.

Another composite flower which has

medicinal properties is the sweet chamomile, a plant which bears a flower closely resembling a daisy. Nowadays the plant is cultivated, and a field of chamomile in full bloom is a pretty sight. The dried flower-heads are used by the chemist, and a common infusion is prepared by boiling half an ounce of the flowers with ten ounces of water. A bluish oil, called *oil of chamomile*, is also extracted from the plant, and largely used by the druggist.

No doubt you have all had peppermint in some form or other. Sweets are flavoured with essence of peppermint, soaps are scented with it, and it is one of the most common remedies for colic. The doctor disguises the scent and flavour of some nasty medicines by adding a little peppermint, and no doubt the chemist could show you dozens of different preparations where this extract is used. The common garden mint belongs to the same family of plants as the peppermint. Perhaps you have seen a peppermint field; if you have ever been in one you must have noticed the sweet, aromatic odour given off by the leaves.

CHAPTER XI

THE FURRIERS

MANY of my girl readers must have stood with their mothers outside a furrier's shop and cast longing eyes on the beautiful sables, chinchillas, and other costly furs displayed within. Those of you who live near London and have taken a walk down Regent Street or Bond Street in the wintertime may have seen in the shops some of the most costly furs ever worn. Often a fashionable lady will pay several thousand pounds for a set of sables alone, and this by no means completes her outfit, for she is prepared to pay hundreds of pounds more for a stole, muff, tie, and cloak made from some other furs.

Of course it is only a few people who can afford such luxuries as these, but nearly every woman wears furs of some kind or other, although in many cases they are cheap imitations. It is of the real furs that we shall

read in this chapter, and no doubt you will be interested in hearing what animals yield them, where they live, and how they are caught.

Quite one of the most valuable skins at the present time is that of the silver fox. This animal is found in the northern parts of Europe and Asia, as well as in Alaska. Its skin is of a glossy black colour, having a little white mixed with it. Generally, stoles, muffs, and ties are made of it, and it takes two of the skins to make a long stole, although as a rule silver fox stoles are rather short, and one skin only is used. The trappers often receive £100 for a single skin, and when it is made up into a stole the lady would probably have to pay £350 for it.

Another very valuable fur is that of the Russian sable. The Canadian sable also yields a costly fur, but it is not quite of such good quality as that of its European relative. The sable is rather a small animal, which somewhat resembles a weasel in form, although it is rather large. The Russian sable is about eighteen inches long, and its tail measures another six inches. The fur is very lustrous, and is of a brownish colour, dotted with greyish-yellow spots on the

1. Sable 2. Silver Fox 3. Sea-Otter

4. Chinchilla 5. Musk-Rat

Photos : Dando and Medland

sides of the neck, and with a yellowish tinge on the throat. As we might expect, the fur is thickest in the winter, and at that time the trapper hunts it. Other species of sables are the tartar and the Japanese sable, but their fur is of very inferior quality, and much of it is used as a cheap imitation of the Russian and Canadian varieties. It takes several of these small skins to make a long coat, and in the case of the more expensive coats, which cost anything up to £4000 or £5000, the skins are all carefully selected and specially prepared.

Probably the fur with which you are most familiar is that made from the skin of the seal. This animal has been hunted more than any other fur-bearing creature, for, unlike the small sable, squirrel, ermine, and chinchilla, it yields a large fur, and seals are fairly numerous. The seal is now protected by Government, so that the trappers are allowed to kill only a certain number each year, in specially-named districts. About twenty years ago there was an enormous demand for sealskin, and the price of the fur went up very rapidly. As the demand became greater and greater the trappers were paid more for the skins, and for a few years

they hunted the seal so remorselessly that the animal was in danger of being exterminated. The Governments of Great Britain and the United States some years ago agreed to make a close time for the seals in a particular area, so that the animal could not be killed during the breeding season, and certain seal-fisheries have been leased to companies, on the understanding that the capture of the animals must be kept within limits. There are several varieties of seals, but the one which yields the most costly fur is known as the fur seal. This animal is found off the coast of Alaska, in the Behring Sea. When fully grown it is six or seven feet long, and weighs about 600 lbs,—that is, it is as heavy as three average men and a boy together. The great value of its skin lies in the thick, reddish-brown under-fur, which is stripped of the coarse outer hairs. You may have seen pictures of the Eskimos and other hunters in search of the fur-seal. The animals are frequently driven some distance inland from the small islets where they congregate in herds, and then clubbed to death, but sometimes the Eskimo harpoons them as they lie on the ice.

Another animal whose fur is highly

prized, but which is becoming very rare, is the sea-otter. In general appearance this creature somewhat resembles a small seal rather than the common river-otter, still hunted in certain English rivers. It lives in the Behring Sea, and is very difficult to catch. A most ingenious method is used by the hunter to warn him of the approach of the otter. The animal spends a great deal of its time under water, in search of small fish, but it occasionally comes to the surface to breathe. Selecting a shallow shelf in the sea, near some rocky and snow-covered islet, the hunter drives a number of rough stakes into the sea-bed, and round the tops of the stakes he winds a long rope, so obtaining an arrangement similar to that used for hanging clothes on 'washing-day.' On the line, between each pair of posts, he hangs a bell, and to the top of the bell is fastened another rope, which hangs down in the water, so that it touches the bed of the shallow sea. When the otter comes along it probably takes this piece of rope in its mouth, thinking it is a fish, and jerks it. This, of course, makes the bell ring, and the hunter, who may have been on the watch for hours, gets his harpoon ready, and lies perfectly still until the animal

rises to the surface, when, with deadly aim, the spear is shot into its side. Sea-otter fur is soft, and of a deep, lustrous black, but when it has been dressed by the furrier it is generally of a dark maroon. The furs are so highly prized that they are not often sold under £120 each. Otter-fur is worn more by rich Russian ladies in St Petersburg than by Englishwomen.

Some very beautiful fur muffs, stoles, and coats which have been very fashionable of late years are those made from the coat of the chinchilla. This gentle, playful little animal somewhat resembles a rabbit in size and shape, but it has a much longer tail and broader ears. It is found in most parts of the mountainous regions of South America, and lives in deep burrows, like the rabbit. The fur is exceedingly soft, and is in great demand as a trimming for velvet cuffs, collars, etc., as well as for hats. It is of a rich pearly-grey colour, with specks of black over it. As the skin is small it can be bought for a few pounds, but it takes a large number of skins to make a coat, so that a complete set of chinchillas may cost anything up to £150.

No doubt you have seen the trimmings of judges' robes, as well as ladies' opera cloaks.

These are probably of ermine. Perhaps you do not know that the stoat and the ermine are one and the same animal. It is only when the stoat goes north that he changes the colour of his coat in winter from a reddish-brown to a yellowish-white, or almost pure white. Strange to say, the tip of his tail always remains black. The best ermine skins come from Siberia, Sweden, and Norway.

An animal which makes its home partly in the water, and which is sought after on account of its costly fur, is the mink. This creature burrows on the banks of rivers and ponds in parts of America and Europe, and is caught by the hunters when it enters the water in search of its prey.

Another aquatic animal is the musk-rat, which yields a valuable fur called 'musquash.' When dressed, musquash is a good imitation of sealskin, or moleskin. The animal gets its name from the musky odour which it emits in summer. It is very common in the rivers of North America, and is caught by the Red Indian trappers in an iron trap, very similar to an ordinary rat-trap. Over half a million skins of the musk-rat are annually imported into this country.

Many cheaper furs are made from the coats of the grey-backed squirrels, which are found principally in North America. Generally, muffs and stoles are made of squirrel fur.

We have seen that most of the fur-bearing animals come from the wilds of North America. The trading companies live in forts around Hudson Bay, and the chief company has for many years been the Hudson Bay Company. To the forts the trappers bring their furs and skins, which have taken them months to procure. The trapper's life is full of adventure. Formerly nearly all the trappers were North American Indians, but this race is gradually dying out, and white men have of late years taken up the industry. When the hunters leave their stations for the distant hunting-grounds, they will probably be away for many weeks. They do not pursue one sort of animal only. Experience teaches them the habits of their quarry, and the best means of capturing it. Sometimes the trapper works in a snow-covered district over a hundred miles in extent. He sets different kinds of traps in all directions, and periodically visits them. In some cases the captured animal has been known to bite off the imprisoned limb and

limp away, leaving a trail of blood behind it. The worst enemy of the trapper is the grizzly bear, and terrible are the conflicts out on the dreary wilds between the man and the beast. Wolves, too, are a serious foe in some districts, and a solitary hunter stands a great chance of being killed if he encounters a starving pack of these fierce animals. The trapper must needs be a very hardy man, as he has to endure great privation, and sometimes for days at a time he has practically to go without food. When he returns with his load of skins, which he draws behind him on a sledge, he spends a long time with the traders in trying to strike a bargain. Nowadays he is able to get fairer prices for his skins, but in the olden times he would get only a trifle, which was out of all proportion to the sum which the trader demanded and received for them. As a rule, he stays at the station until his money is nearly all gone, when he once more ventures out into the wilds on his perilous task.

CHAPTER XII

THE BANKERS

NO doubt most of my young readers have had some transaction with the Post Office Savings Bank in one form or other. If you go to school you may have joined the school bank, which of course is in connexion with the Post Office; you perhaps save up your odd pennies in your little tin banks and money-boxes at home, and then, when you get a good sum, you proudly enter your name as a depositor in the Savings Bank, and a book is given you showing the state of your account. It is a good thing to be thrifty and 'lay by something for a rainy day.' If more people had been thrifty, our workhouses would not be so full. We never know what misfortunes are in store for us, and it is well to provide for them, as far as we can, by saving up our money. The pence soon grow into shillings, and the shillings into pounds. It has been truly said: "Take care of the

pence, and the pounds will take care of themselves."

Now what examples of animal or plant bankers are there? Well, in the first place, all those plants, known as *perennials*, which live on for many years, dying down in the autumn and coming up again in the spring, are capital examples of bankers. Instead of saving money, they save the starch and sugar. Their bank lies in the lower parts of their stems and roots, and all the summer and autumn they are paying the starch and sugar into it, so that, when 'hard times' come in winter through the ground being frost-bound and they cannot get any food from it, they are able to draw on their banking account. Bankers of this sort are the crocuses, pansies, daffodils, snowdrops, primroses, and dahlias.

Biennials, or those plants which make their roots, stems, and leaves the first year and flower the second year, are bankers too, but they are not quite so thrifty as the perennials. They save very hard the first year, but they cannot maintain the effort, and so, after they have flowered in the second year, they die. A good example of this kind of banker is the sweet-william.

Now the *annuals* are very thriftless plants. They never save. They seem to be quite content to live for one year only, and then die down. There are many people who seem to follow the methods of the annuals. They spend every penny they earn, and perhaps a little more than they earn, appearing never to trouble about what is to happen should they be ill and unable to work. "Never mind!" they say, "we will enjoy ourselves while we can." The result is that when trouble comes and they are no longer able to earn there is great distress.

Another good example of plants putting something by, or of having a banking account, is provided by the tree. When the cold weather sets in and the winter is near the leaves of deciduous trees fall off. The reason for this lies partly in the fact that leaves contain much living matter and valuable food-stuff. Just before the fall of the leaves these valuable materials are withdrawn from the leaves and stored in other parts of the plant, so that it is more able to withstand the rigors of winter.

But for the very best examples of bankers in Nature we must turn to the animals which lie dormant in the cold months, such as the

squirrel, hedgehog, dormouse, toad, frog, newt, and the reptiles. A country walk in the woodlands in September will probably enable you to see a squirrel busily collecting his winter store. What an active little creature he is! His banking account consists of dozens of acorns, nuts, and berries arranged in heaps under some dead leaves, either in the hollow of the tree where he intends to pass the winter, or in some convenient spot near by. Instinct tells him that his natural food will be very scarce later on in the year, so that he must collect as much as possible. When at length he retires to his sleeping-place, which is probably in the fork of some tall tree, his mind is at rest, for he knows he can draw on his banking account until spring comes round again. Unlike many dormant creatures, he sleeps and wakes by fits and starts all through the winter. Perhaps he will remain in a profound slumber for two or three weeks at a time, after which he will wake up for a few hours and descend the tree to partake of a good meal, returning then to his bed for another period of sleep. The dormouse also sleeps and wakes in turns. On warm, sunny days in winter he is tempted from his cosy corner,

when he has a good meal on any vegetable food he has put by, and then retires again.

Even those hibernators which sleep soundly for three or four months at a time, such as the hedgehog, toad, newt, frog, and snake, are bankers, although in another way. They do not actually store up food before entering on their profound slumber, but they eat and eat all they can just before retiring for the winter. Thus their bodies are very plump, and they have a plentiful supply of fat, which enables them to live until their natural food can once more be obtained.

CHAPTER XIII

THE CHORISTERS

Join voices, all ye living souls: ye birds
That singing up to heaven-gate ascend,
Bear on your wings and in your notes His praise.
Ye that in waters glide, and ye that walk
The earth, and stately tread or lowly creep,
Witness if I be silent, morn or even,
To hill or valley, fountain or fresh shade,
Made vocal by my song and taught His praise.

MILTON, *Paradise Lost*

SOME of the boys who read this book may be in a choir. Or some of you and your sisters may be members of a choral society, or may have taken part in glees, concerts, and so on. It is quite likely, too, that at Christmas-time you have gone round the streets singing carols. By the latter I do not mean the discordant noises some children shout through people's letter-boxes, but tuneful carols that have been properly prepared some time beforehand, and sung under the leadership of a good conductor.

Nature's Workers

A sweet and pure voice is one of Nature's greatest gifts, and happy should the boy or girl be who possesses one. Guard it jealously, for Nature is not prodigal of her gifts, and should we abuse any of them we most assuredly will suffer for it.

As a nation we have long been called unmusical. It is the custom in some countries for quite poor and uneducated people to take their 'part' in the music that they love, but there are very few English people who can do this. True, certain parts of England, such as the Potteries, possess famous bands and choral societies, but over a great part of the country these are the exception rather than the rule. The Welsh have long been famed for their singing, and the poet may have been thinking of these people of the hills and dales when he wrote:—

I hear the creaking of the wain,
I hear the reaper's merry strain;
As each the needed part supplies
To form the grateful harmonies!

In this chapter we are going to speak of our feathered choristers, which we may hear on any bright spring morning pouring out their sweet song in the leafy tree-tops, and well-

nigh, we might think, bursting their little throats with so much vocal energy. Perhaps some of us never notice a bird's song, unless, perchance, we keep the bird in a cage, where we hear it singing under the worst possible conditions. But just picture a world devoid of birds, or "suppose the birds were mute, and nightingales and larks were dumb as perch or trout." "Familiarity breeds contempt" is a very old proverb, and it certainly applies to the way in which most of us hear our feathered songsters. If we were cast adrift on the ocean, and landed on a desert island where there were no singing birds, I am sure we should miss the voices of our feathered friends, and there would be that dreadful 'stilly silence' of which one famous shipwrecked man once spoke.

To appreciate the different carollers in the tree-tops and hedgerows you should take a walk in the country early one bright spring morning. Then it is that the song of birds is at its sweetest. This is the mating season of the year, and there are many ardent lovers looking around for mates. It is the male bird which invariably has the sweet and powerful voice, and right well does he use it too in his courtship. Often one demure

little female sits alone on the tree-top, and there may be a vocal duet, trio, or even quartette in a tree near by. Little by little the lovers approach her, all anxious to 'show off' by means of their voices, and her choice may rest on the singer which has the clearest and most powerful note. And then while the nest is being built, the eggs laid, and the brood hatched, the faithful 'husband' sits on a twig by his mate's side, during his intervals of rest, and cheers her up by his sweet song. He is not 'talking' to her in this way, for almost all birds have a 'language' quite apart from their song. The call note, alarm note, and chirp and chatter of a bird are very different from its singing voice.

For many years there has been a discussion among naturalists as to how birds learn to sing. Some people believe that the song of a bird is innate—that is, that the power to sing was given to the bird when it was hatched, and so was brought into the world with it. Others think that the song of a bird is no more innate than language is in us. Just as we have to learn to talk by hearing our mothers and other people speak, so the birds have to learn to sing by imitating their parents' voices.

The Choristers

A writer in *Knowledge* gives an interesting account of the singing-lesson of a yellow-hammer. In it he says:—"One bird, the pupil, with a slightly weaker and less decided song, was answering another which sang in a clearer and more finished style. There was no mistaking the fact that the first song came from the more accomplished songster, and it was hard to resist the conviction that the other was an imitation. Several times the instructor gave the complete song, 'A very, very little bit of bread and no cheese,' and the pupil replied also with every note. Three times in succession the teacher gave the song without the final note, and the pupil duly replied with a song one note short."

Those people are best able to enjoy the song of a bird who know which bird is singing. A very little practice will enable you to distinguish the different singers. Which bird do you like best? Some boys prefer the canary's voice, others that of the goldfinch, while still more say there is nothing to beat the song of the nightingale. The poet, Drayton, places the nightingale, or 'philomell,' as he calls it, first in his list of singing birds, when he says of it:—

Nature's Workers

To Philomell the next, the linnet we prefer,
And by that warbling bird, the wood-larke place we, then
The red sparrow, the aspe, the redbreast and the wren,
The yellow-pate, which though she hurt the blooming tree,
Yet scarce hath any bird a finer pype than shee;
And of those chanting fowles, the goldfinch not behind,
That hath so many sorts descending from his kind.

Most bird-fanciers class the voices of our common singing birds into 'regulars' and 'irregulars.' The former sing a set piece over and over again, while the latter keep no particular order in their notes. Examples of the 'regulars' are the chaffinch, hedge-sparrow, and wren, while the 'irregulars' are represented by the blackbird, thrush, and robin. The song of the chaffinch has been humorously described as "Just a little bit of bread and *no* cheese," with a pause and rise of note on the 'No,' as though to emphasize the fact. Time after time will he repeat these notes. In some chaffinches the phrase is shorter than in others, but that bird is considered the best which can go through the greatest number of consecutive notes. The song of the yellow-hammer is very similar, and it is difficult to distinguish the two birds by their singing-voices, although the notes of the yellow-hammer are 'thinner' than those of the chaffinch.

The Choristers

The nightingale has a superb voice. The notes are very soft, and the whole song has a melodious, fountain-like trill. Some of the notes seem as if they were emitted from a reed, and there is a strain of sadness in the song. Many people think this bird sings at night only. This is not the case; it sings just as freely in the daytime, but there are so many bird songs to attract our attention then that we may not notice this grand caroller. The song is at its best in April, May, and June, after which the bird sings very little. It frequently keeps to the same tree or shrub night after night, and it returns to this place year by year. The poet says of the places the nightingale frequents:—

Low shrubs she sits in, and adorns
With musick high the squatted thorns;
But highest oakes stoop down to heare,
And list'ning elders prick the ear;
The thorn, lest it should hurt her, draws
Within the skin its shrunken claws.

Other songsters with beautiful, clear voices are the warblers. The sedge-warbler, which makes its home among the sedges by the riverside, has a sweet continuous warble, and its throat expands a great deal when it is singing. The reed-warbler has a very

similar note, which becomes louder and louder as you approach its nest.

The family of finches have very sweet singing voices. One of the purest voices is that of the goldfinch, and this is one of the few cases in which a bird that has handsome plumage is also a good singer. Perhaps some of you have seen this bird sitting in its nest in an apple-tree. The voice of the greenfinch is not as powerful as that of its relative, the goldfinch. Now and again its notes are soft and plaintive, and, at other times, they are rather harsh. Of course you all know the pipe of the bullfinch, or 'Bully,' as you call him.

One of the birds which can keep up song longest is the skylark. You must have watched this powerful singer rising higher and higher in the air, and descending in a circular manner, all the while pouring out his sweet carol, which ceases abruptly directly he alights on the ground.

CHAPTER XIV

THE SCAVENGERS

THOSE of my young readers who live in towns are quite familiar with the sight of the dustman coming round to their houses once or twice a week to empty the dust-bins of the rubbish and refuse that have been collected. This man is sometimes called a *scavenger*. The work that a scavenger has to do may be very unpleasant, but it is quite necessary work, for all kinds of disease germs make their homes in rubbish, and these are carried away to be destroyed in the dust destructor.

Now you know that there are millions of small animals, birds, and insects running about over the earth. Many of these creatures are killed and partly eaten by beasts and birds of prey, but thousands and thousands of them die a natural death. What becomes of their dead bodies? We very rarely see a dead bird lying on the ground as we walk about, and yet we know

that some of the birds die of illness or old age. We know, too, that the birds have no undertakers, as the ants have. Then where are they buried, or how are they got rid of? The answer to these questions is, that in a great number of cases their dead bodies are removed by Nature's scavengers.

Quite one of the best scavengers is the stork. There are several species of these tall and stately birds, but the one of which we are speaking is the common stork, which is found in most European countries, as well as in Northern Africa in the winter. In many Egyptian towns it was the custom for the people to throw out their refuse overnight into the streets, and during the night the storks would come and eat up much of the refuse.

Far away in Abyssinia the hyena is an excellent scavenger. Here too the refuse is cast into the narrow streets, and under cover of the darkness the hyena stealthily glides into the city and clears it up. It is said that in many walled cities of Abyssinia the natives actually cut holes in the walls large enough to allow the hyena to pass through.

Another fine scavenger is the jackal, which lives in India, Ceylon, and parts of Africa

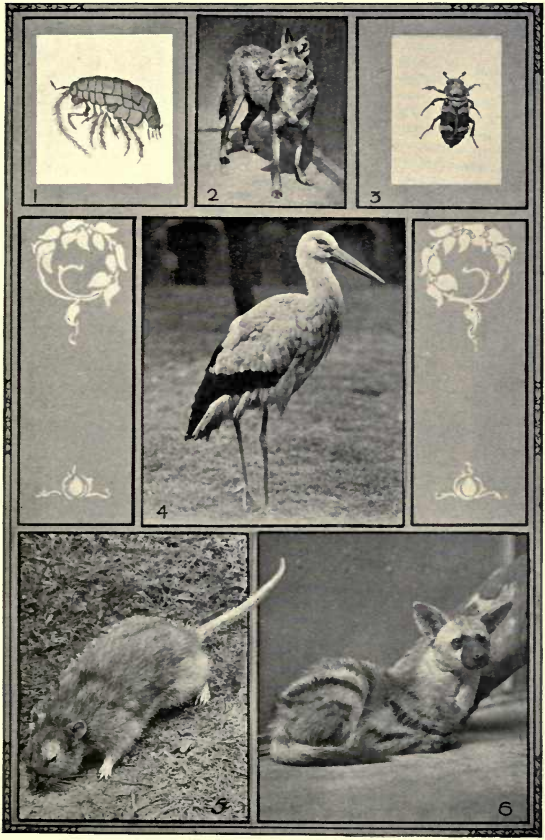
and Southern Europe. The most putrid flesh one could possibly find is greedily devoured by this savage and cowardly creature. It may well be described as a coward, for it frequently attacks wounded animals, but often runs away from another animal half its size. Its sense of smell is very acute, and it frequently scents a buried person deep down in a grave. If this be the case, the beast scrapes away the earth after the manner of a dog which is trying to open up a rabbit's burrow, and will not rest until it has feasted on the decaying flesh of its victim. Those of you who have seen this animal in captivity may have been struck with its blood-curdling cry. Big-game hunters in some of the great forests where the jackal makes its home tell us that its cry quite unnerves them at times. The animal often follows in the track of the hunters in search of any dead game which may have been left behind.

A very good African scavenger is the aardwolf, which inhabits the veldts of South Africa. This animal is a member of the same family as the hyena and civet cat, and it lives in burrows in the ground. Most of its food consists of carrion and small mammals.

Nature's Workers

So far we have considered scavengers of the dog tribe which live in hot countries, where the removal of carrion and filth is most necessary. But we have our scavengers too. One of the chief of these is the carrion beetle. This is a prettily marked insect, with red bands on the abdomen. Should a dead bird, rat, mouse, shrew, or any other small animal be lying about in the hot sunshine its flesh will soon begin to decay, and when this happens it is highly probable that the carrion beetles will come up in pairs to bury it. These insects can scent rotting flesh for a considerable distance. For several hours they work hard in burrowing around the dead creature until they quite undermine it, when it sinks by its own weight. As soon as it is below the level of the surrounding earth they scrape the excavated soil back over its body. While all this has been going on the females have been laying their eggs inside the putrid flesh, so that the young grubs should have an abundance of their natural food when the time should come.

The rat, despised and rejected of all men, is nevertheless an excellent scavenger. Scores of particles of meat may be lying about outside our kitchen doors, where they have been



1. Sand-Hopper 2 Jackal 3. Carrion Beetle

4. Stork 5. Common Rat 6. Aardwolf

Photos: Berridge and Holmes

shaken from the table-cloths. These tiny pieces would quickly putrefy, and many disease germs might make their homes in them, whence they would probably pass to our butter, jam, and meat on the dining-tables. Along comes the sharp-eyed rat in the darkness of the night, and quickly eats up any such scraps. In this respect the cat is often a good scavenger too, but pussy as a rule will not touch rotting flesh.

Those of you who have been for holidays at the seaside may have seen those curious little creatures known as *sand hoppers*, when you have turned over a large piece of seaweed. These creatures spend all their lives in searching for decaying matter on the seashore, which they greedily devour. Even the common shrimp and prawn are scavengers as well, but their carrion is found in the water. Crabs and lobsters also feed on carrion.

A capital scavenger, which nearly all of us must have seen stalking over the fields, is the carrion crow. Possibly you may confound this bird with the rook, especially at a distance. There are several points of difference though. In the first place, the crow usually hops over the ground, while

the rook walks. Rooks like to live in communities, and the rookery is frequently built on trees near houses; the crow builds his nest on a tree standing by itself, far from the haunts of men, and these birds invariably fly about in pairs, while rooks are seen in flocks. At the base of the crow's beak there are a number of short, stiff hairs, while the beak of the rook is quite bare. The food of the crow consists of carrion, dead fish, crabs, and insects, and when it is very hungry it sometimes attacks and devours small birds and quadrupeds.

The buzzard, which was formerly very common in this country, but which is now nearly exterminated, used to be a very good scavenger. Moles, mice, frogs, toads, etc., formed its prey, and while it preferred to catch and kill the animals, yet it was by no means averse to eating dead creatures. The same remarks apply to the owls, about which we have already spoken.

CHAPTER XV

THE DETECTIVES

NEARLY all boys, and some girls too, like detective stories, when they have grown old enough to understand them. You set your wits to work to fit together all the clues, and you join in an imaginary chase of the villain, until he is run to earth. At times you are thrown quite off the scent, and it is very difficult to strike the right trail again.

Now just as there are human detectives so there are detectives in the lower orders of creation. Probably the greatest animal detective is the bloodhound. Of late years much progress has been made in the tracking of people by the bloodhound. This animal tracks his victim entirely by scent. There are two scents which he uses, one given off by the person's body into the air around, the other by the feet on to the ground. The first scent is used if possible, but it is so soon dispersed by the wind that the other scent

is the one more often relied upon. For miles and miles these faithful animals will follow the hunted person. At times the dogs are baffled, and they show great uneasiness and a keen sense of disappointment, but when they once more strike the trail their joy is great. Do not imagine that the bloodhound when it finds its quarry pounces upon it and mauls it to death, as foxhounds do the fox. They may perhaps try to drag it to their master, but otherwise they would not injure it in the least. As a rule the hounds pick up the scent quickest when there is a trail of blood, and because of this they are called *blood* hounds. In America they were often used in hunting slaves who had fled from their masters.

Police dogs are now used in many countries for the tracking of criminals. A few years ago an experiment was performed in France with these dogs and two policemen disguised as burglars. In the presence of the chief of police and several minor officials of the French police force four dogs were taken to a large open field on the outskirts of Paris. All the dogs were muzzled, and held by leashes. The two policemen were given about fifteen minutes' start, and were soon

lost in a wood. They made their track as difficult as possible to follow by doubling back and swerving now on one side and then on the other. At a given signal the dogs were slipped from their leashes, and at once took up the scent. So intelligently did they follow the trail and so hot was the pursuit that in a few minutes the 'burglars' were caught.

Another famous animal detective is the noble St Bernard dog, which is used for tracking lost travellers on the snow-covered Alps. You have all seen a picture of this grand creature, with its little keg of brandy strapped round its neck, bending over the prostrate man who has been overcome with fatigue, and who has lain down to die. How very human he seems to be, as he ministers to the sufferer's needs by licking his face and hands! And if he succeeds in restoring animation to the stricken man how joyfully he bounds back to the hostel near by in search of the good monks, who will quickly follow him until they find the lost traveller!

One of our best English detectives in animal life is the foxhound, but, unlike the services rendered by the St Bernard dog and bloodhound, this animal's powers serve no

useful purpose except for a rather cruel and barbarous sport. Whatever bad deeds may be ascribed to poor Reynard, there is no reason why he should be hunted, and probably mauled to death, simply to gratify the primeval passions of a few so-called sportsmen. If the hounds were trained to simply catch the fox and then to leave it alone not so much could be said against the sport. Have you ever 'been in at the death' after a run with the hounds? If so you have seen a sickening sight. Often the savage animals maul the poor fox to pieces if they chance to catch it before any of the huntsmen arrive. Public opinion is slowly awakening to this barbarous form of cruelty, as it has done in the past to cock-fighting, badger-baiting, and prize-fighting, and no doubt all 'blood' sports will one day be stopped by law.

But however cruel the sport may be, there is no doubt that foxhounds are highly intelligent animals. They require very careful training before they can run with the pack. As a rule baby foxhounds are born towards the end of the year, and in the spring their training begins. At first they roam in couples about the farm where

they are brought up. They are not usually reared at the kennels, but left in the charge of small farmers for seven or eight months, and when their training is complete they are sent back to the kennels. Probably the farmer is a huntsman, so that he knows the requirements of these animals. The young puppy is always getting into mischief. He is a thorough thief, and the farmer's wife has to keep a strict watch on him, or some of her joints of meat would be missing. He soon grows a big, active, and strong dog. As soon as he arrives at the kennels his training is much more severe. His first practical work is known as 'cubbing.' This consists of hunting the cubs of the foxes—that is, the baby foxes. Perhaps a pack consisting of two or three couples of old hounds is taken out with three or four couples of young ones, under the charge of the whips. The foxhound is rather a tiresome dog to train, as he will wander about and get into mischief. Every time he strays he has a slash with the huntsman's long whip. He is also taught to obey the different calls of the huntsman's horn, and not to make a false cry when there is no scent. A very important part of his training consists

in making him give the well-known cry when he does pick up the scent. If he turns out a good cub-hunter he may be promoted to the pack when real fox-hunting begins in late autumn.

CHAPTER XVI

THE LODGERS

PERHAPS of all our titles for animals and plants none is more peculiar than this. You all know what the human lodger is. Probably some of you have lodgers at home, and when you grow up and go out into the world to earn your living it is quite likely that you will live in lodgings.

But what can we well describe as lodgers in natural history? Why, hundreds of insects, and squirrels, and dormice, and hedgehogs, and hosts of other small creatures, which get their living from plants. The plant is generally a tree, and we may well describe it as the 'landlord.'

One of the greatest 'landlords,' which supports more lodgers than any other plant, is the oak. You know the grim old 'monarch of the forest' quite well. Many is the time that you have climbed his spreading branches in search of acorns. Maybe

for centuries he has reared his lofty head and spread out his gnarled and knotted limbs. A sturdy old warrior is he! Perhaps in course of time he has fallen into decay and his very vitals have been eaten away, thus forming a safe harbourage for dormant squirrel, wasp, or hornet. But what cares he! For a century more he will defy King Time to do his worst, and year by year he will house his guests, and bring forth his fruit in due season.

Now it is not of the squirrels, insects, and other creatures which find homes in the oak and feed on him that we are going to speak to-day. Our lodgers are quite different. They are not 'paying' lodgers either; they take all, and give nothing in return. Can you now guess what they are?

Every year, on the 29th May, many boys still keep up the custom of sticking oak-apples in their caps, and if you ask why they will say:

The twenty-ninth of May
Is oak-apple day.

They may not know that sprigs of oak-apples have been worn on this day for the last 250 years in commemoration of the

return of Charles II to his throne on that day, after escaping some years before from Cromwell's soldiers in an oak-tree. It is of the oak-apples and oak-galls that we are going to speak.

When May comes round next year I want you to watch the oak-tree carefully and see how quickly these galls grow. They seem to be swellings on the twigs, leaves, or buds of the tree, and they are produced by the attacks of many different species of gall insects. These insects are very small, and belong to the same family as the green-fly which infests your rose-bushes.

The life-history of the oak-apple gall-fly is very remarkable and interesting. During the winter the first eggs are laid by an insect which has no wings. It greatly resembles an ant, and it is armed with a sharp instrument at the end of its body, called an *ovipositor*, by which it pricks a tiny hole in the soft bud of a twig. This ovipositor may be compared with the sting of a bee or wasp. The creature selects a suitable bud, and darts its ovipositor into it. When the tiny hole has been pierced the gall-fly lays its eggs in it, and leaves them there. Dozens of gall-flies may attack

the buds of the same tree. After the eggs have been laid, a swelling soon begins to take place in the bud. There has been a great difference of opinion among naturalists as to what causes this swelling and how the 'apple' is formed. Rennie, the famous naturalist, says that the insect covers her egg with a glutinous substance, and this prevents the sap that flows through the puncture made by the ovipositor from being spread over the outside of the leaf and wasted. The sap is thus kept to the space occupied by the eggs, and expands and forces out the pellicle of gluten that confines it until it closes up the puncture, thus stopping the escape of the sap and completing the process. However this may be, there is no doubt that where galls are formed there is a loss of sap, and this is shown by the malformation and discoloration of the leaf or twig.

If you dissect an oak-apple do so in a *vertical* direction, and then you will probably see some fine oval-shaped granules, each of which contains a grub. You may be able to pick out quite a large number of grubs on the point of your knife. If these grubs had been allowed to develop they would have produced *winged* gall-flies.

1. Oak Cherry-Gall 2. Moss-Gall on Wild Rose 3. Oak-Apples
4. Oak-Spangle 5. Oak Marble-Gall 6. Oak Currant-Gall

Photos : Holmes, Rochester

These creatures would lay their eggs in summer in the *rootlets* of the oak, and from the eggs a brood of *wingless* females would come, which would lay more eggs in the manner described at the beginning of the chapter, and so the life-cycle of the insect is complete.

There are many different kinds of galls on the oak-tree. The most common are the cherry-gall, currant-gall, marble-gall, and oak-spangle. The cherry-galls and oak-spangles are found on the leaves, the former being of a bright red colour, and resembling a ripe cherry, and the latter small, pink, and flat. Currant-galls are found on the catkins, and they look like little brown currants. The marble-galls are hard and woody, and are borne on the twigs. At first these galls are soft and green, but they quickly become brown and hard.

Many other trees and shrubs besides the oak bear galls. You may sometimes find them on sycamore leaves, as well as on the poplar. Two very common galls are found on the wild rose. These are the moss-gall and mace-gall. The former, sometimes called the *bedeguar*, is much beloved by girls, on account of its resemblance to a little ball

of green and crimson moss. Some moss-galls are three or four inches in diameter. The mace-gall, which is about the size of a pea, may be seen on the under-side of some rose leaves.

CHAPTER XVII

THE PLASTERERS

Whence drew the martin his superior skill
To knead and temper, mason-like, the slime
Of street or stagnant pool, and build aloft
Beneath the cornice brink or shady porch,
His snug depending couch, on nothing hung;
Founded in air, and finished with a neat
Convenient aperture, from whence he bolts
Sudden, and whiter brisk returns, with mouth
Filled for his offspring." HURDIS

YOU will soon recognize, after reading the above verse, which example has been taken to illustrate this 'trade' among our lowly workers. Of all our little feathered 'tradesmen' none does his work more carefully than the 'plasterers.' For hours and hours the house-martin may be seen groping about in the muddy pools, river-banks, ponds, and other moist places, busily collecting its nest-building materials, and flying backwards and forwards with them to the eaves of the house or some favourable cornice. A bird's nest is a most

wonderful piece of architecture. No human being could fashion nests as neatly as many of our little feathered friends weave them. Of course I am not referring to the clumsy nests of the pigeon family, or the rook, crow, and so on, but to the neat little structures of the tits, the finches, the martin, and many others. Hurdis admirably describes this art of nest-building in the following verse:—

But most of all it wins my admiration
To view the structure of this little work,
A bird's nest. Mark it well, within, without.
No tool had he that wrought, no knife to cut,
No nail to fix, no bodkin to insert,
No glue to join; his little beak was all.
And yet how neatly finished! What nice hand,
With every implement and means of art,
And twenty years' apprenticeship to boot,
Could make me such another?

Many people confuse the swallow with the martin, but there are several points of distinction between the birds. The swallow has a very long, forked tail, while that of the martin is much shorter. On the lower half of the back of the house-martin there is a pure white patch of feathers, which is absent on the swallow. On each tail feather of the swallow there is a large white

spot, but this cannot be seen unless the tail is fully extended like an open fan.

The swift, too, is sometimes confused with the martin and swallow, but this bird is totally brownish-black, except the chin, which is of a creamy tint. The most marked difference, though, is in its broad expanse of wing. It is said that the swift has greater powers of sustained and rapid flight than any other of our migrants.

All three birds build their nests in different styles. The martin builds a *hanging* nest under the eaves of a house, as a rule, or under some projecting brickwork. The swallow selects some convenient lodging-place, such as a rafter, and places its nest *on* the support. The swift builds in holes in buildings or cliffs. Many boys and girls speak of those hanging nests just above their bedroom windows as *swallows'* nests. This is wrong; they belong to the house-martins.

Have you ever watched a pair of house-martins building their nest? They first make the foundation by sticking pellets of mud, which they bring in their beaks, in the shape of half a circle up against the wall and on the eaves. It is said that they work up this mud, or 'bird-mortar,' as we may well call it, by

mixing it with the saliva from their mouths. It does not take them long to stick these pellets to the foundations, and the nest gradually assumes the shape of a crescent, until it finally resembles half a cup, with the handle broken off. The birds leave a small hole at the top through which to enter and leave the nest. Sometimes the top of the nest is not fixed to the eave of the house at all, but a narrow rim is left all round. I have seen a nest, though, with the top fastened securely to the woodwork, except for a space of about four inches. The nest was neatly lined with pieces of horsehair, feathers, and dried moss. After the first brood was hatched and had left the nest, the hen-bird laid a second clutch of eggs. These were eggs of a pure white colour.

Another neat plasterer is the song-thrush, but this bird plasters the *inside* of its nest. It generally selects a hedge overhanging a ditch in which to build, and it may often be seen picking up pellets of mud from the bottom of the ditch. You may confuse the nest of the song-thrush with that of the blackbird, but the latter bird does not line its nest with mud.

The Plasterers

Perhaps the most curious examples of bird plasterers are the flamingoes. Montgomery describes this bird as follows:—

Wading through marshes, where the rank seaweed
With spongy moss and flaccid lichens strove,
Flamingoes, in their crimson tunics, stalked
On stately legs with far-exploring eye;
Or fed and slept in regimental lines,
Watched by their sentinels, whose clarion-screams
All in an instant woke the startled troop,
That mounted like a glorious exhalation,
And vanished through the welkin far away,
Nor paused till, on some lonely coast alighting,
Again their gorgeous cohort took the field.

You may have seen a picture of this curiously shaped bird, whose body is somewhat similar in form to that of a stork. It lives in flocks on silent sea-coasts and deserted marshes in various parts of Southern Europe and Northern Africa. When feeding, flamingoes are generally drawn up in lines like a regiment of soldiers, with sentinels on guard. Their nesting-places are on the swamps, and they scoop up the mud into hillocks and neatly plant it with their broad feet. For many years pictures of these birds were drawn representing them as sitting on their nest in a straddling position, with their legs hanging down on each side. But

as their legs are more than two feet long, and the mud nests are only about a foot high, this is quite impossible, and it is now known that the birds double their legs beneath them.

CHAPTER XVIII

THE ANGLERS

NO doubt you all know what is meant by angling. Many of you who live in the country where there is a nice, wide river or a large lake may have gone fishing. Even boys who live in busy London may be seen on a Saturday morning going to the nearest pond, armed with marmalade jars, and long sticks for fishing-rods, to the ends of which are attached pieces of twine with bent pins for hooks. What fun you have in catching the 'tiddlers,' and other strange pond creatures! And how proudly you take your captures to school on Monday morning, and place them in the aquarium!

But who are our anglers in animal life? Just think for a minute or two if you can name them. Perhaps you think the duck is an angler. You often see her thrusting her head and neck into the water, and coming up again with a mouthful of mud. But she has not been trying to catch fish;

her quest has been for worms and pond insects, which lie on and in the mud.

There is one animal, however, which is a capital angler, and it may still be found in some of our rivers. This is the otter. He belongs to the weasel family, and he makes his home in a burrow near the water's edge, and generally under the overhanging trunk of an old willow or elm-tree. If we could see inside its home we should find a cosy nest, lined with grass and leaves, and littered with fish-bones. If it were the breeding-season there would probably be four or five baby otters in the nest.

You would be lucky if you saw an otter swimming about in the river. It is a very timid creature, and dives under water at the least disturbing sound. Sometimes, though, you may be fortunate enough to see one on an islet in the stream, making a tasty meal from some of its captured fish. It has a large, flattish head, shaped something like that of a seal, and short ears. Its toes are webbed, and the tail is slightly flattened. There are two kinds of fur, the outer and inner. The former is composed of long, coarse, dark-brown hairs; the latter is short and fleecy. A full-grown otter is about

two feet long, and the tail extends another fourteen or fifteen inches.

Years ago otter-hunting was a very popular sport in Britain, but, like most 'blood' sports, it is gradually dying out. There are still a few packs of otter-hounds in the country. Most of the huntsmen carry long poles, which they poke into the hollow trees growing on the riverside. Should an otter be turned out of its hiding-place the hounds give full cry and leap into the water after the frightened animal. Of course it dives, but it must come to the surface to breathe, when the savage dogs make a grab at it. Down it goes again, and so the chase goes on. The poor animal is fighting against fearful odds, and at last his struggles grow fainter, he is unable to remain under water for so long at a time, and the savage-looking jaws of the dogs close upon him.

The human angler does not like this animal angler in the least. There is some reason for this dislike too. The otter is not content with merely catching fish for food, but he kills them just for the sake of doing so. Often when his hunger is satisfied he still goes on catching the small roach, dace,

and other fresh-water fish which he kills and jerks on the bank. It is an interesting sight to watch him eating a fish. If there are a number of baby otters round him, he tears pieces of flesh from the back of the fish and jerks them into the waiting mouths of his young ones. He invariably eats down the fleshy back of his prey, and leaves the fins, tail, and bones.

The Chinese and Indians use the otter for a very novel purpose. They teach the animal to catch fish, and bring it to them, much in the same way that a retriever dog brings back game. This species of otter is rather different from the British species, but otters in England have been trained to fish for their masters as well.

The most curious, and perhaps the most perfect, example of an animal angler is a large fish known as the *angler-fish*. Sometimes this creature goes by the name of the *fishing-frog* and *sea-devil*. It is often found on the British coasts, but some species live down in the sea at an enormous depth. It has been estimated that this fish can live at a depth of three miles. At this depth there is enormous water-pressure. No diver can go down into the sea much below 150

1. Otter 2. Angler-Fish or Sea-Devil

feet. At some of the greatest depths at which the angler-fish is found, there is a pressure equal to nearly three tons on each square inch of its body, and to fit the creature for these conditions Nature has provided it with a very strong air-bladder. Should this particular fish come towards the surface of the ocean, his body would be torn to shreds by a terrific explosion when he reached a certain height. The air contained in the air-bladder would expand when the pressure was removed, and the strong walls of the bladder would burst. Of course, this species is quite different from the 'angler' which frequents our coasts.

Let us see how this cunning angler catches his prey. To understand this we must note the shape of his body. He is about four or five feet long, and he has an enormous mouth. His eyes are close together on the top of his head, and they look *upwards*. On the top of his head there are long spines which stand up, one of which is slightly bigger than the other. At the end of the longer spine there is a kind of knob which is about the size of a tea-spoon, and glistens much like the 'spoon-bait' used by the human angler in pike-fishing. This knob is

the 'bait' of the angler-fish. If we wanted to see this curious creature at work, we should have to go down on the bed of the ocean. There he lies, immovable as a log, except for the long spine which he gently bends backwards and forwards over his head. So still is he, and so hidden by mud, that no other fish is aware of his presence. It is said that he purposely covers himself up with slimy mud, so that he will be invisible. All that the fish see is a gently swaying and shining knob. Fish are very inquisitive creatures, and several of them swim up to investigate this unusual occurrence in their domain. At first the artful angler holds the 'bait' quite upright, and when he finds one or two of his intended victims around it, he slowly bends it forwards and downwards towards his mouth. The fish follow it right into his gaping jaws, which snap upon the prey. The 'angler' fishes all day long, and his appetite never appears to be satisfied. Wriggling herring and mackerel, flat plaice and soles, are all 'fish for *his* net,' and sleep alone puts an end to his labour. We could not find a better example of an angler than the angler-fish.

CHAPTER XIX

THE BUILDERS

HITHERTO all the examples of 'trades' among our lowly workers have been taken from animals, plants, and birds, with most of which we in Britain are quite familiar. In this chapter, however, we are going to speak of some very minute creatures, so small that it is almost impossible to see them with the naked eye, but whose work is so important that huge tracts of land have been formed by their help.

Those of you who have spent your holidays on the south-eastern coasts of England must have noticed the tall chalk cliffs standing high up from the sea. From twenty to thirty miles away similar cliffs are to be seen on the French coast, and the bed of the channel connecting these two shores is also composed mainly of chalk. If you were to dig into the ground some miles inland from these cliffs you would find the soil

mainly composed of chalk too. Nearly all the grass-covered Downs of Southern England have a chalky soil.

Now the little builders which made these rolling Downs, tall cliffs, and ocean bed lived in the sea millions of years ago. Countless numbers of them were born, lived their short life, and died. They had hard, shell-like coverings enclosing their little jelly-like bodies. When they died their soft tissues soon wasted away, but their minute shells, which contained a large proportion of lime, sank to the bottom of the sea, and countless millions of them were piled one above another. Men of science, who have spent many years in finding out how the earth's rocks were formed, have given these tiny creatures the name *globigerinæ*, and they belong to a group of animals known as *foraminifera*. The material formed by their shells on the ocean floor is called *ooze*, and dredgings of ooze taken from many parts of the sea-bed, when placed under a powerful microscope, are seen to contain shells similar to those which we find in a piece of chalk. Scientists also tell us that it takes about ten millions of these shells to make a pound of chalk, so that when we

consider how many millions of pounds of chalk there are in the cliffs, ocean bed, and inland soil to-day, we can get a faint idea of the infinite number of these small organisms which must have lived and died to make them.

The same thing is going on to-day. These minute specks are still being born, and forming their shells from the lime held in solution in the water, and countless numbers of the shells are being deposited day by day. The great oceans of the world are full of these tiny shell-fish, and step by step they are building up new lands, and altering the shape of the continents. Is it not interesting to think that as we go about the chalky downs and cliffs we are walking on the tiny shells of creatures which lived in prehistoric seas?

No less wonderful are the enormous tracts of land added to the surface of the globe by the agency of the coral animals. A writer once said when speaking of these creatures: "The land formed by coral-builders furnishes to-day a dwelling-place for more than 5,000,000 of the human race, and the prodigious amount of work which these never-tiring builders have accomplished is proved

by the fact that over two and a half millions of square miles of sea-bottom are paved with coralline sand and mud." There is one point, however, in which this writer is slightly in error. He speaks of the 'work' of the coral animal as though the creature did this building of its own accord. The secretion of the lime from the sea-water is as much an unconscious process as is the formation of bone from the mineral matter which is contained in our food. We cannot say that we 'work' when we are forming our bones from the food we eat. And certainly a creature cannot be said to work when it is dead, and it is not until the death of the coral animal that the building begins.

Most of you have seen pieces of coral rock. Some girls wear so-called 'coral' beads. In many of our public museums there are several specimens of coral. Some are shaped like tufts of leaves, others like twigs, and still more like branches of trees. Perhaps some of you have ornaments made of coral in your homes. If you had not been told differently you might have thought that coral is a kind of rocky flower which grows at the bottom of the sea.

There are very many different kinds of

coral-builders, but all of them, whether they be polyps, sea-anemones, or any other variety, have one point in common. Each one builds its bony skeleton and shell from the lime held in solution by the sea-water, and it is this lime, or calcium carbonate, as we should call it, which sinks to the ocean floor when the creature dies, and which forms a foundation, in turn, for countless other limy skeletons.

One of the most marvellous works unconsciously effected by these minute creatures is the formation of the Great Barrier Reef, which runs along the coast of Queensland, in Australia. This reef is about 1200 miles long, and runs parallel with the shore at an average distance of 120 miles away. In its whole length, which is equal to the distance from Land's End to John o' Groat's and back again, there is only one opening large enough to admit ships with safety.

The Pacific Ocean is dotted about with numerous coral rocks, islands, and reefs, and many well-known island groups, such as the Maldive Islands, the Laccadive Islands, the Caroline Islands, and others, owe their origin to the coral animal.

We have no traces of the coral-animal

in British seas, because the creatures cannot live in water below a temperature of 68° F. As they need water of this kind, which must, moreover, be clear and shallow, they are limited to an area of about 1700 miles on each side of the equator.

In some parts of the world the reefs are ring-shaped, and inside the ring there is a lagoon of shallow water. Such formations as these are called *atolls*.

Let us now see how these coral islands first became covered with plant life, such as stately palms and luxuriant tropical shrubs. None of these things would grow on the coral rock; they must have sand, mud, and other suitable soil for their roots. A great scientist explains the presence of vegetation as follows: "After the growing corals reach low-tide level the polyps mostly die; but the waves continue to dash against the reef and detach huge masses of rock. These are hurled high up on the reef, and crumble to dust. Sand, too, is churned up by the angry waves, and fills the crevices in the rocks. For thousands and thousands of years the waves continue to pile up on the reef sand, mud, pebbles, and broken masses of coral, some of the masses being two or

three hundred cubic feet in size, and a field of rough rocks begins to appear above the waves. Next a beach is formed; and the bank of coral *débris*, now mostly above the salt water, becomes planted by the waves with sea-borne seeds. Trailing shrubs spring up; and afterwards, as the soil deepens, palms and other trees rise into forests, and the coral island or atoll comes forth finished."

And so the work goes on! Century after century finds the reef slightly larger. Maybe some land animals, reptiles, etc., are carried from the mainland or floating trees, and find a home on the reef; they quickly multiply and the 'baby' island is soon well stocked. Birds visit the island, build their nests in the young trees, and bring up their broods. Insects flit through the air, and stray ones make a new home on the rising reef or atoll. At length Man comes and finds birds, beasts, plants, and other forms of life ready for his service. He makes a dwelling, and settles down with his wife in the new home, living for a time on the fish, birds, and animals which were there before him. As the years go on his family increases, and in the course of centuries

villages and towns are built to accommodate the rapidly increasing race.

And the origin of all this? Simply the tiny coral creatures, that lived and died in the deep, blue sea! Wonderful little builders, are they not?

CHAPTER XX

THE THIEVES

SURELY we have no examples of these bad characters among our animals or birds!" you will say. We are always taught to despise a thief as being a person with no honour, and unworthy of our company.

But there are some birds which quite deserve to be described as thieves. One of them is the magpie. You may have seen one. It is about the size of a pigeon. Some boys tame these birds and teach them to imitate words. In its wild state the magpie usually lives in the woods, and gamekeepers detect its presence by its constant chatter among the trees. It steals birds' eggs, and sometimes takes young birds out of their nests and devours them. It is especially attracted by bright objects. If you succeed in taming it, keep a sharp eye on your spoons, forks, silver coins, thimbles, and so on. Cases have been known in

which tame magpies have in the most cunning and sagacious manner taken dozens of these small, bright articles out of the house, and hidden them in the roof of an outhouse, or in some barn or tree. These hard metal objects cannot possibly be of use to the bird and it appears to take them simply for impish amusement.

Another bird with very similar habits to those of the magpie is the jackdaw. You are all familiar with his "jack, jack, jack," up in the tree-tops, and probably many of my young readers have tamed these birds. If you miss silver spoons, pearl buttons, and other small, bright objects from the house, and you keep a jackdaw, just do a bit of detective work with the bird. The probability is that he is the thief. In his wild state he often steals other birds' eggs during the spring.

A bird which may lose its life through its pilfering habits is the jay. Gamekeepers shoot these birds at every opportunity, because of their liking for partridges' and pheasants' eggs, as well as those of any small bird. The jay has beautiful plumage, and is a constant chatterer, but it has a bad character simply because of its thieving

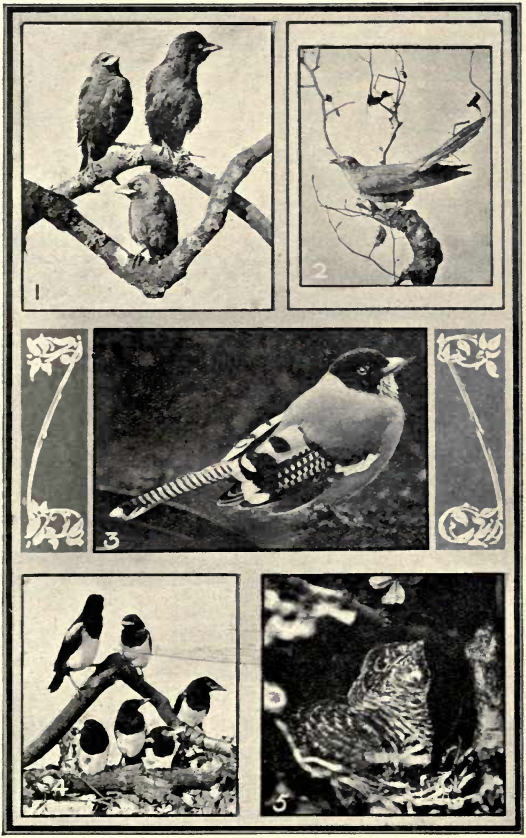
propensities. It is a most wary bird, and it hides in the thickest trees and densest shrubs, so that it is extremely hard to find. Sometimes it frequents the gardens and fields, and pulls up peas, beans, and small seeds.

There is one redeeming feature about these thieves. They devour immense quantities of harmful insects and grubs, which would otherwise seriously injure the farmer's crops.

The last thief we will notice is the cuckoo. This bird may be said to be a thief only so far as it steals places in other birds' nests in which to place its eggs. The strange thing is that, as a rule, it selects the nests of much smaller birds. Thus hedge-sparrows, larks, chaffinches, meadow-pipits and other small birds are made use of in this way by the cuckoo, who is apparently too lazy to build a home for itself. Many boys think that the cuckoo robs other birds of their eggs, but this is wrong. It lives principally on small insects, moths, and caterpillars. Some people think that the bird lays its egg on the ground, and carries it to a nest in its beak, gently dropping it among the other eggs.

A writer in the *Westminister Gazette* says with regard to this: "There has been a

great deal of mystery, and there is still in some quarters much mystery, as to how the cuckoo places the egg in the nest of another species; for, compared with the size of the usual nest chosen, the bird is itself out of all proportion, and it is hardly likely that such a pugnacious species as the robin, for instance, would allow a bird of that size, and of such a hawk-like appearance, deliberately to approach its nest for the purpose of laying an egg therein without a serious fight. As a general rule, too, it will be observed that the nest usually chosen is so situated and so built that it would be quite an impossibility for a cuckoo to lay its egg in the nest. The act of foisting the egg on to the chosen foster-parents has very seldom been witnessed, for the hen cuckoo proceeds with the utmost caution in her operations. The nest wherein the fraud is about to be perpetrated is not left to chance, but is deliberately chosen beforehand; the egg is deposited on the ground, and then carried in the beak by the unnatural parent and inserted into the nest. There is a very widespread belief that the hen cuckoo will lay an egg to resemble the eggs of the nest she has chosen for her own egg so that it may be unnoticed, but this cannot



1. Jackdaws 2. Cuckoo 3. Jay

4. Magpies 5. Young Cuckoo on Nest

Photos: Parkin and Holmes

be accepted as a fact. It is true that there is frequently a certain resemblance between the egg of the cuckoo and the eggs of the foster-parent, and there is a strong reason for supposing that this is a result of heredity; the one line of cuckoos which happened to lay eggs resembling in some degrees those of some one other species unconsciously choosing that species always as foster-parents, Nature having by natural selection guided the birds to that end. It is improbable that one cuckoo will choose the nest of several species wherein to insert her eggs, and it would be probably found, if investigation were possible, that whereas one cuckoo will always choose a titlark's nest for its parasitic habits, another will invariably choose a wagtail's, another a robin's, and so on."

There are numerous examples of thieves among quadrupeds, such as members of the weasel family, which rob the farmyards and take toll of the young birds in the woods; the crafty fox, which has similar habits; the prowling wolves; the sneaking hyenas and jackals; and the river-otters; but we have spoken of most of these animals in other chapters.

CHAPTER XXI

THE ILLUSIONISTS

I SUPPOSE nearly all boys and girls like to see a good conjuring performance. When you were tiny tots you were spell-bound at the wonderful tricks that the clever conjurer did. His magic wand was able to produce plum-puddings out of silk hats, real live chickens, which laid golden eggs, from empty space, and scores of other marvellous things. Now that you have grown older, and know how many of these tricks are performed, you are not quite so interested in his performance, but you still like to see those tricks which are known as 'illusions.' Those of my young readers who live in London may have visited St George's Hall, where they have seen most weird illusions in that 'Home of Mystery,' as it is called.

"All make-believe!" you say, after the illusionist has finished his performance. Just so! But many things in everyday life are

'make-believe' too. Even nature 'makes believe.' In many cases she does it for some good purpose. What we call 'protective colouration' is to a large extent 'make-believe.' The lapwing lays eggs on the sandy field which imitate in colour the soil surrounding them. 'Make-believe' again, is it not? Many boys may pass quite near the eggs without seeing them, as at a short distance they look like little lumps of earth. The polar bear and arctic fox change the colour of their coats in winter so that they closely resemble the snowy background. The tiger, in whose coat the black stripes look like the stalks of the reeds, is enabled to lie unobserved in the jungle until his unwary prey is within striking distance. He, too, 'makes believe.' Away on the African veldt one may sometimes see a man disguised as an ostrich walking slowly up to a group of these birds quietly feeding in the distance. Suddenly his lasso is thrown with unerring aim and the 'human' ostrich has captured a fine bird. Quite one of the most wonderful illusionists in the world is the leaf-insect, or 'walking-leaf,' as it is sometimes called. The body of this creature exactly resembles the leaf on which it lives,

and even its eggs are frequently mistaken for the seeds of the plant.

But what we want especially to consider in this chapter are the members of the large and beautiful orchis family of plants. Botanists often describe these plants as 'illusionists,' and they quite deserve the title.

One of the most common varieties is the bee orchis. This plant may be found in bloom during June, and the most likely place to find it is on pasture-land. At first sight it seems to be a large brown-backed bee mounted on the top of a thin, erect stem. The body of the 'bee' is variegated with yellow. The two lateral petals resemble the wings of the bee.

Quite as wonderfully marked is the fly orchis, which may also be found blooming in the pastures, but a month earlier than the bee orchis. In the centre of the lip of the plant there is a small bluish spot, which exactly resembles the common 'bluebottle.' The two side petals are so slender that they are curiously like the feelers of the fly. Should one take a casual glance at the flower, he might think a few flies were hanging on the stem of some plant which had shed its flowers.

The Illusionists

Because of the marked resemblance of most of the different members of the orchis family to some insect or animal, naturalists name them after their counterparts. Thus we have the spider orchis, which is rather common on the Downs in the south of England, and which blooms in May and June. The dark purple lip petal of this flower, with the greenish markings on the remaining two petals, is very like a spider. The butterfly orchis, found blooming in the meadows in June, resembles the butterfly in general appearance; the frog-orchis is not unlike a frog in the markings and arrangement of its petals.

CHAPTER XXII

THE POACHERS

THOSE of you who live in the country, especially in those districts which are thickly wooded and where game preserves are kept, may have heard that a gang of poachers had been caught one dark night by the gamekeepers and the village policeman. For hours and hours the gamekeepers may have been hidden among the hazels and bracken, and at last their patience was rewarded. Not for some time will these desperate human poachers again shoot the pheasants as they roost in the tree-tops, for they will be sent to prison.

But the gamekeeper has even greater worry with the four-legged poachers. Perhaps you know that he has to keep the preserves well stocked with game, so that when his master brings the shooting-parties down in the autumn they may have good sport. If there are few pheasants and

partridges the sport will be poor, and the gamekeeper's master will want an explanation. So we see that the keeper has to do all he can to have a plentiful supply of game-birds.

Now the most important time of the year for the gamekeeper in this matter is the spring, when the partridges and pheasants are nesting, and afterwards bringing up their broods. You may have seen a partridge's nest. It is generally in an exposed position, on the bank of a hedgerow, or in a ditch. There is a large amount of dry grass, leaves, etc., which the birds have collected and placed in a heap, and in the middle of this the mother bird has scooped out a hole large enough to place her eggs in. There are often a dozen eggs in one nest. The nest of the pheasant is very similar to that of the partridge; indeed, the partridge sometimes lays her eggs in a pheasant's nest, and gamekeepers occasionally find a mixed brood of partridges and pheasants brought off from one sitting. Perhaps the pheasant uses more loose twigs in building her nest, and the eggs are slightly larger than those of the partridge.

You know that there are many prowling

animals in the woods and spinneys. Long ago these night poachers, such as the stoat, weasel, and polecat, were more numerous, but of late years they have been ruthlessly shot down, so that they are nearly exterminated. These little, crafty, four-legged poachers — 'sneak-thief,' the gamekeeper sometimes calls one of them—have taken a very heavy toll of young birds, and eggs as well. Even the crafty old hedgehog is by no means averse from a nice tasty meal from a nest of eggs, although his food consists mainly of insects. All that the keeper finds in the morning, when he visits the nest, are a number of broken egg-shells, and the prospects of another fine covey of partridges being reared have quickly gone. Often these animals attack the young birds in the nest, even when the mother bird is with them. Long and fierce have been the duels fought in the darkness of the night between these blood-thirsty poachers and the parent birds. Craftily the stoat, weasel, or rat glides up to the nest and snaps at the plucky bird. Like a flash her beak darts out towards the eyes of the prowler. And so the fight goes on, sometimes for an hour or more, but the birds invariably get the worst

of it, and even if they escape themselves, their brood is quickly destroyed. We can quite understand why the keepers shoot these night poachers at every opportunity, and stoats, weasels, and polecats are becoming creatures of the past, although in a few districts they are still fairly common. Not only do these animals rob the game preserves, but they have always been a serious pest to the farmer who keeps chickens.

With all their bad habits, these little poachers are very courageous. The weasel is only about seven or eight inches long, and the stoat not much larger, but they have great strength, and they will often attack hares, rabbits, and 'farmyard cocks,' all of which are much bigger than themselves. When their prey has been killed they drag it away to their burrows, which are generally made in sheltered banks. A little stoat may have to drag a fat rabbit over the ground for a quarter of a mile.

One of our chief poachers at the present time is the fox. You are all familiar with the picture of Reynard, and perhaps you have seen him fleeing from the hounds. He is a poacher even when looking for a home, for he frequently steals the burrows of other

animals and converts them into his own 'earth.' There is probably no other animal found wild in this country which is quite as sagacious and wily as Reynard. If the majority of farmers had their way he would be persecuted like the stoat and weasel, but his is a privileged life on account of the ancient sport of fox-hunting, which is still carried on in most English counties. Game-keepers have orders to preserve the cubs so that the huntsmen may not 'draw blank' when the hounds visit the woods in winter. The fox has a very voracious appetite, and he devours birds and many small quadrupeds. He is especially fond of eggs, as well as honey and fruit.

But not only are the wild animals poachers. Cats and dogs often make raids on nests in the most cunning manner.

A gentleman, writing to the *Sporting Times*, states:—"Walking past a stable adjacent to which was a henroost, I observed an old brown, curly-coated retriever coming out. He proceeded to a grass plot near by, where I saw him disgorge something. For the moment I imagined the dog to be ill, but a second glance proved that he had merely put an egg out of his mouth, and,

watching him carefully, I noticed him chip the egg and proceed to lick up the contents."

The pine marten, which is still found in some parts of this country, is a practised poacher. This animal has a long, slender and lithe body very much like that of the weasel, to which family it belongs. It can climb trees with the greatest ease, and frequently stalks birds, especially at night-time, when they are roosting. Should it come across a nest of eggs it will quickly clean them all out. This crafty poacher will sometimes lie on a branch of a tree for hours, watching with cat-like cunning for any birds which come within its reach.

CHAPTER XXIII

THE RUNNERS

WHATEVER are we going to talk about in this chapter?" you will say. We have heard of the 'Bow Street runners,' who tried to capture Dick Turpin and other famous highwaymen. We know, also, that runners were employed to deliver messages by hand long before the Post Office was established. But who may we properly call 'runners' in animal life?

This term is generally applied to those large, flightless birds, such as the ostrich and emu, which speed over the ground at a great rate by the aid of their legs only. There are several families of birds whose members cannot fly, but most of them are powerful runners.

Our list of running birds must certainly commence with the ostrich. You are all familiar with the picture of this large and powerful bird, which bears those beautiful plumes in his wings and tail, for which he

is famed all over the world. Perhaps you have heard, too, that he is a stupid bird, and buries his head in the soil when pursued, thinking that the enemy is no longer near because he cannot himself see him. This, however, is quite wrong. The ostrich is quite as sagacious as most birds, and, far from hiding his head in this stupid manner, he would be more likely to attack his pursuer with a blow from his 'heel.' Ostrich farmers tell us that this silly story about the bird is quite untrue. Most of the ostrich farms are in South Africa. Perhaps the 'farm' consists of a 100-acre field which has been fenced in. In this field there will be a number of incubators where the hen-bird's eggs are artificially hatched, and there are also places wired off for the baby birds to live in. The young birds are invariably brought up by hand, so that they may be as tame as possible.

If we carefully examine the ostrich we shall find that he has two toes only. This is quite unusual among birds. Another peculiarity is that he has a bushy tail, while most birds that cannot fly have stumpy projections for their tails. His wings are very small in proportion to his size, and when he runs he keeps them down at his

sides. Should he attack anyone he would run at his foe with his wings outstretched. The cock birds often fight the farmers, but one can escape quite easily by taking refuge under the mimosa tree, which is very common in the home of the ostrich. The mimosa has prickly branches which spread out fanwise not far from the ground, and so the tall bird cannot conveniently get beneath them. He can run with extraordinary speed, and the fleetest horse could not catch him out on the veldt.

The emu, which is nearly as large as the ostrich, can also run with great speed. This bird was formerly found in all parts of Australia, but of late years it has been driven away from many districts. Its legs are not quite so long as those of the ostrich, and the foot has three toes. The wings seem to be part of the bird's back, and they can hardly be seen unless he is handled. The feathers are of a dull, sooty-brown colour. The sport of emu-coursing is practised in some parts of Australia, and the chase over the wide and rolling plains is very keen. Like our fox-hunting, rabbit and hare-coursing, badger-baiting, etc., this sport is gradually dying out.

The Runners

The first cousin of the emu is the cassowary, which is found in New Guinea, Australia, and the island of Ceram. This bird lives in the vast forests and scrubs, and it can run very fast, and kick with great force. The feet are the chief weapons of defence in these powerful runners. Perhaps you cannot imagine a bird kicking you, but if you received a blow from one of their strong legs it would knock you over. As a rule, they kick only in self-defence. One of the species of cassowaries has a comb on the head which resembles a helmet, and because of this it is known as the helmeted cassowary.

If you saw the ostriches, emus, and cassowaries feed you would think they were big gluttons. They all have very voracious appetites, and eat more quickly than almost any other creature. You may think that farmyard fowls can pick maize up fast, but their rate of feeding is as nothing compared with that of these large runners. They do not bite or suck their food, but toss it down their throats. Fruit, eggs of small birds, and worms are jerked into their stomachs with the greatest speed.

There are certain British birds which

spend most of their time on the ground and run from place to place, but these birds have well-developed wings and can fly when they wish. These are the corncrake, pheasant, and partridge.

The corncrake, which is commonly called the landrail, is a summer visitor to this country. It derives its name 'corn-crake' because it is generally found in the cornfields, and it repeats a note many times which can best be imitated by the syllable 'crake.' It is of a reddish-brown colour, and its habits and general appearance resemble those of the partridge.

Pheasants and partridges are quite familiar birds to most of you. You may have seen the former running about in spinneys and woods, and perhaps you have been to a 'pheasant shoot' some time in October. The partridge generally flies about in the company of several of its mates. This little family is known as a *covey*. No doubt you have seen these birds squatting on the ground, and running very rapidly when disturbed, before taking to wing.

CHAPTER XXIV

THE SWIMMERS

IN two chapters of this book we have spoken of those birds which run but do not fly, such as the ostrich and emu, and we also made a few remarks on the waders, such as the stork and the flamingo. In this chapter we will talk about the swimming birds.

Those of you who live in the country are quite familiar with the ducks which may be seen on most ponds belonging to a farm-house. Hurdis speaks of the drake as follows:

Through ev'ry plash he wades, with chatt'ring beak
Fishes the miry shallow as he goes,
In quest of snail, of slug, or winding worm;
Or launching from the shore his feather'd fleet,
Pilots his dames along the flooded dyke.

You have no doubt seen a number of ducks gracefully swimming over the water, and every now and then thrusting their long bills and heads quite below the surface,

until they seem to be standing on their heads. When their heads appear again their broad bills contain a lot of slimy mud, which they work from side to side and squeeze out at the edges. Many a tasty tit-bit do they find in the muddy bed of the stagnant water!

Let us carefully examine one of these swimmers' feet. We find the three front toes are joined together by a kind of thick skin, so that the foot forms a capital paddle. As the duck swims along she makes a stroke with each leg in turn, and at every stroke her toes are extended so as to make the widest 'paddle' possible. As soon as the stroke is completed she partly closes her toes, the skin wrinkles up, and the foot is drawn forward in preparation for the next stroke. Were the toes kept extended there would be great resistance to the advancing foot by the water, and a consequent loss of speed. The duck's glossy feathers contain a large amount of oily matter, which causes the water to run off. Just underneath the long outer feathers there is a layer of soft down. This encloses a good deal of air, and the bird's body is therefore light and buoyant.

Quite one of the most graceful swimmers

we have is the swan. Milton says of this stately bird:

> *The swan, with arched neck*
> *Beneath her white wings mantling proudly, rows*
> *Her state with oary feet.*

And the poet, Montgomery, admirably describes it in the passage:

> *White from her prow the murmuring surge recedes:*
> *So the swan, startled from her nest of reeds,*
> *Swells into beauty, and with curving chest,*
> *Cleaves the blue lake, with motion soft as rest.*

It is the graceful arched neck and majestic motion while swimming that endear this bird to most of us. The front toes are the 'oars,' and they are strongly webbed. The back toe is not webbed; it stands out quite distinct from the rest of the foot.

In the Middle Ages the swan was a 'royal' bird. Many kings have made laws specially protecting it. Thus Henry VII ordered that any person found guilty of stealing a swan's egg should be liable to imprisonment for a whole year. Long before this the Plantagenet kings declared the swan to be exclusively their property. No common person was allowed to keep a swan except

by special permission from the king, and this consent was considered a mark of royal esteem. The fortunate subject who had obtained the royal favour stamped a private mark—the 'swan mark'—on the bill of the bird, so that he should recognize it. The marking of swans was called 'swanupping,' and for centuries its practice has been annually carried out on the Thames on behalf of the Crown, and other owners, who stock the upper reaches of the river with these graceful adornments.

A capital swimmer, which may be seen on most of the lakes in our public parks, as well as on many large ponds in the country, is the waterhen, or 'moorhen,' as boys more often call her. Strange to say, her feet are not webbed like those of most swimming-birds. All four toes are separate, but they have flaps of skin on them which help to make them very thick, so that when brought together they form good 'paddles.' You are all familiar with this pretty and active bird. She is about the size of a dove, and her body is very prettily marked with patches of red, yellow, and white on a dark ground, with green legs and red 'garters.'

Another swimming-bird, which may often

be seen on the same lake, is the coot. This bird may be distinguished from the waterhen by the bald patch on the front part of its head. In the winter-time she leaves the waterhen behind, for she migrates to the south coast of England, where she stays in the creeks and caves until spring returns.

Those of you who have sailed down one of our tidal rivers to the sea must have noticed a flock of sea-gulls. These birds may frequently be seen far inland, especially if a period of bad weather be approaching. London children often see them on the lakes in the parks, or diving in the muddy waters of the Thames. The poet evidently thought the gulls more fortunate than inland birds, for he makes them say:

Birds of the land, ye may carol and fly
O'er the golden corn 'neath a harvest sky;
Your portion is fair amid fields and flowers,
But it is not so broad or so free as ours.
Ye are content with the groves and the hills,
Ye feed in the valleys, and drink at the rills;
But what are the joys of the forest and plain
To those we find on the fresh, wide main?
We hold our course o'er the deep or the land,
O'er the swelling tide or weed-grown strand;
We are safe and joyous where mad waves roll,
We sport o'er the whirlpool, the rock, and the shoal;

Nature's Workers

Away on the winds we plume our wings,
And soar the forest of all free things.
Oh! the seagull leads a merry life
In the glassy calm or tempest strife.

Cook

You must have wondered at the marvellous way in which gulls appear to sit on the waves. Their bodies are so buoyant that they seem to be floating like little boats. The bird lightly skims the sea, and every now and then plunges his head beneath the waves in search of the unwary fish. A number of them settling on the water, and twittering as they feed, is an interesting sight. For miles and miles they will follow in the wake of a pleasure-steamer, in search of choice morsels thrown overboard. Should black storm-clouds appear they will fly, with foreboding screech, far inland, and take refuge in the marshes and rivers until calm weather once more appears.

One of the most curious swimming-birds is the pelican. Those of you who have visited the London Zoo, or Kew Gardens, have no doubt seen a group of them. They have enormous flattened bills, terminated by strong hooks, and underneath the bill there is a pouch of skin, which forms a convenient 'pocket' for the fish which the bird catches.

It is an interesting sight to watch the parent bird bringing fish up from its pouch and feeding its young ones. The feet are strongly webbed, so that the birds are very good swimmers. Its long neck gives the pelican something of the appearance of a swan, but it is a larger bird and not so graceful in its movements. In the summer large flocks of pelicans may be seen on the shores and river-banks of Greece, but they pass the winter in Egypt and other parts of Africa, as well as in the lands around the Red Sea.

The penguin is another curiously shaped swimming-bird. The wings are mere stumps, and have no quill feathers, but they are covered with a thick scaly skin. When swimming the bird makes admirable use of these wings as paddles, and employs them as forelimbs when walking. The toes are completely webbed. On land the penguin is always seen in an upright position. The sharply pointed breast-bone resembles the keel of a boat when the bird is swimming.

Montgomery gives a good description of the penguin in his 'Pelican Island,' a poem I advise you all to read. Referring to this bird, he says:

The heavy penguin, neither fish nor fowl,
With scaly feathers and with finny wings,
Plumped stone-like from the rock into the gulf,
Rebounding upward swift as from a sling,
Through yielding water as through limpid air.

It is said that the penguin is the best diving-bird in the world, and no doubt its strong 'paddles' greatly assist it in this operation.

CHAPTER XXV

THE BEGGARS

SURELY we have chosen a curious 'trade' for the subject of this chapter!" you will say. Just so, but some of the 'gentlemen of the road,' as tramps are often called, look upon their means of earning a living quite as a trade. An old tramp once said to me: "Well, sir, I have never done a day's work in my life, and I never mean to. For forty years I have worked between here and London, and I have never taken any harm yet. Now and then I do a bit of singing down some of the streets, and sometimes I hold a bundle of matches or laces in my hand, and ask for a copper. In the summer I sleep out in the fields, and in the winter, if the weather is not too severe, I crawl under a hayrick or into some barn." Of course I have not quoted the tramp's actual words, for tramps have a language which you would not understand, but he said quite enough to show me that

he looked upon 'the profession,' as he called it, as quite a hard-working one, and a perfectly straightforward means of earning a livelihood.

Now just as we meet these lazy loafers in human life, so do we find their counterpart in the plant world. There are some plants which derive their entire nourishment from other plants to which they attach themselves, and in many cases they starve their hosts to death. They are known as *parasitic plants*. Some animals too are parasitic, and these are generally spoken of as 'parasites.'

For our illustration of 'beggars' we will confine ourselves to the vegetable kingdom. The chief parasitic plants which grow in this country are the *mistletoe*, *dodder*, *broomrape*, and *toothwort*.

The mistletoe is the best known of these. One thing in its favour is that it is only partly parasitic. You know that plants feed by their leaves as well as by their roots, and the mistletoe obtains a certain amount of nourishment through its green leaves. The hosts to which it most commonly attaches itself are the apple-tree, poplar, fir, and oak. It seems to prefer those trees having soft barks. You have no doubt

seen mistletoe growing on the branch of a tree. If you traced the tiny roots through the hard outer bark you would find them firmly embedded in the rich sap-wood of the tree, and as the sap rises the mistletoe roots drain some of it off to feed the plant's stem and form the berries. Parasitic plants may be likened to the blood-sucking leeches that doctors in bygone times applied to the human body when it required 'bleeding.' Just as the leech clung to the inflamed skin and sucked out some blood, so the roots of these plants suck the sap, or tree 'blood,' from the sap-wood. But of course the work of the leech was beneficial to the 'host,' not harmful.

The dodder is completely parasitic, and a more miserable, dishonest specimen of a plant it would be hard to find. It is a thief of the worst type, for not only does it make its host feed it, but it clings to the host for support too. It may be seen twining around hop-stems, clover, flax, and other plants. It has a thin, wiry stem, which sends out minute suckers. These suckers embed themselves in the tissue of the host and draw a great deal of its food away. A field of clover infested with dodder is of little value, and farmers

thoroughly detest this plant thief. There are no leaves, so that it makes no food whatever in an honest way.

The broomrape is another leafless beggar. It is frequently found on the roots of the broom, as well as on the delicate rootlets of peas. It derives all its nourishment from its host.

The toothwort sometimes selects the roots of the hazel for its host, but it is not nearly as common as the other parasitic plants we have mentioned.

CHAPTER XXVI

THE WOODMEN

HAVE you ever been for a walk along the ridings of a large wood? If so, you may have seen a number of trees with a patch of paint on the bark, or a cross burnt in their trunks. This indicates that the trees have been selected by the woodman to be cut down. Two centuries ago their timber would probably have been required for the national "hearts of oak," such as those engaged in the Battle of Trafalgar, but to-day they are wanted for quite different purposes.

It is a fascinating sight to watch woodmen felling a tree. Perhaps some of you have seen pictures on the cinematograph, which show the Australian woodmen cutting down a giant tree. Their sharp axes crash on the trunk of the mighty monarch of the forest until they eat right into his very heart, and he trembles in the breeze. Ropes have previously been fastened to his top-

most branches, and the woodmen, retiring to a safe distance, pull on the ropes with all their might. The giant sways backward and forward as though reluctant to lie low on the earth, but at length the crash comes, and the mighty tree, which has defied the winds and storms of centuries, reigns in the forest no more.

Very often it requires great ingenuity to cut down trees so that they shall fall in a certain place. Maybe the trees stand near houses, or by some railings in a park, and they have to be felled in such a way that they will not damage the houses or railings by falling across them. The woodman's *reason* has to assist him; he has to put on his thinking-cap, as we say, if the tree is to lie exactly on the spot where he wants it to lie.

But what will you think of a quiet little animal, of gentle and retiring habits, and with no higher power than that known as *instinct* to assist him, which can plan out his tree-felling quite as carefully and successfully as man does? He has no sharp axe or cutting saw to assist him, neither does he need the use of ropes to help him in his task. And yet, with infinite patience, per-

severance, and very hard work, the tree which he has selected is felled, and, wonder of wonders, it falls in precisely the direction he wishes it to fall!

This clever little woodman is the Beaver. Many years ago beavers inhabited these islands, but they have long since been extinct, and are now found only in Zoological Gardens, or in one or two isolated private collections. Of late years a few British gentlemen, who are very fond of animals, have introduced colonies of beavers into their grounds, and one of the largest colonies in Great Britain is to be found in the island of Bute.

You are all familiar with the picture of a beaver. He is about two feet long—if we exclude his broad, flat, and scaly tail—and he has short ears, a blunt nose, small fore-feet, and large webbed hind-feet. He is a nocturnal animal, and his favourite haunts are rivers and lakes which are fringed by trees. His jaws are very powerful, and his teeth extremely sharp and strong.

If we wish to see the beaver in his natural haunts we must go to distant Canada, away in the dreary solitudes of the north-west, where the trapper seeks his prey, and where

the human voice is seldom heard. In the vast forests of larch and birch and poplar, where the woodman's axe has never rung, there are remote and sheltered valleys, intersected by tiny streams, and dotted with little lakes. If we go down one of the streams we shall find that at intervals it widens out into pools some twenty or thirty feet wide, and if we seek for the cause of this, the chances are that we shall find banks of sticks, earth, roots, stones, and weeds forming a dam across the stream. This dam has been built up with great ingenuity and tireless energy by beavers, for the purpose of making the water of sufficient depth to construct their houses, or 'lodges,' as they should be called.

We are lucky if we find any lodges, for the beaver has been remorselessly hunted by the trapper on account of his valuable fur, and the animal is rapidly becoming extinct even in his last home. Neither could we expect to see the animal at work, for he selects the dark autumn nights in which to make his dam and construct his lodge, which will be a safe retreat for him during the long Canadian winter when the streams and pools are locked in ice for months at a time.

But we can well imagine what takes place in the silent valleys during the long night-watches. The beaver shows feverish activity in preparing his winter home. He selects a suitable tree, and quickly sets to work on the trunk by tearing off, first, the lichens and bark, and then rapidly gnawing into the heartwood. He cuts deeply into the side nearest the water, and if the tree be a small one, with a trunk of about nine or ten inches diameter, he will fell it in an hour. Sometimes the beaver attacks a very large tree, and it will take him many nights to accomplish his work, but he will be well rewarded by the numerous twigs and branches which can be torn off easily and used for constructing the dam, or for forming a framework of the lodge.

Close observers of the beaver tell us that the animal shows his wonderful instinct when the tree is about to fall. Unlike the human woodman, who is well out of range of the longest branches when the final crash comes, the little animal woodman is close to the trunk. He has cut all round the trunk so closely to the centre that only a narrow neck of wood is left, and at this stage a child could push the tree over. But the

beaver has to take the final bite with his eye keenly watching the quivering trunk above him, and when the last supporting chip has been bitten away, the animal, with a lightning movement, skips backward in the opposite direction from which the tree now falls with a mighty crash. He scuttles off as fast as his legs can carry him, for the noise frightens him, and he remains in his hiding-place for several hours until he thinks all danger has passed. Then he sets to work on the branches, cutting off the smaller ones, and carrying them down to the stream. Night after night this work goes on until he and others of his kind have built homes which, in ingenuity and architecture, even human beings could not surpass.

The lodge is from twelve to eighteen feet in diameter at its base, and five or six feet in height. The framework consists of long poles interlaced with twigs and roots, over which is plastered a thick layer of mud. The beaver does not use his tail in plastering the mud, as is popularly supposed, but he plasters with his feet. In the top of the lodge a small hole is left which acts as a ventilator, and in the winter time, when

nine or ten beavers are snugly housed in the lodge, the warm air may be seen ascending through the hole in a kind of misty vapour. The entrance to the lodge is at the base, and is always under water. The beaver is extremely clean in his habits, and he takes great pride in the smooth mud floor on which he lies.

The beaver's food consists of the bark of trees, leaves, roots, and berries, and as when the frosts set in he is unable to roam about the forest, it is necessary to lay in a store of food during the autumn. Near the lodge there may be seen branches of poplar, beech and other trees, sticking in the mud with their tops slightly above the water, and at intervals these branches are dragged into the lodge and their bark is eaten. Sometimes a number of roots of various water-plants are obtained, and in this way the beaver manages to exist until spring returns.

You will be sorry to hear of the way in which the trappers entice the beaver out of his lodge and trap him. They make a small hole in the dam so that the water in the pool runs away. In a short time the floor of the lodge is on a higher level than the water, and becomes dry. The beaver knows at

once what is the matter, and he ventures out to repair the dam, only to be caught in the cruel jaws of the trap. He struggles violently, and perhaps drags the trap from the dam down to the bottom of the water, but the hunter knows that those remorseless iron jaws will never give way. The poor beaver lies in the mud, and the water in the pool is tinged with blood. His struggles become weaker, weaker, weaker, and in a short time all that remains of one of the most clever and industrious animals in the world is a stiff and stark body, of no more use than the logs around, except for the thick fur which will, perhaps, be made up into a bishop's hat, or be exhibited many hundreds of miles away in a furrier's shop.

What better example of a worker in Nature's workshop could we have, with which to close our pleasant chats, than the industrious, persevering, and intelligent beaver? How can his mysterious powers be explained? For many years heated arguments have raged between naturalists as to whether these powers, which are so closely akin to those possessed by human beings, are the outcome of intelligence or reason. But call it what we will, the fact remains

that the beaver and many other animals, too, order and plan their lives just as we do, but the knowledge, which takes us half a lifetime to acquire, seems to be possessed by them almost as soon as they come into the world.

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